North GREY REGION

1959

CONSERVATION REPORT

DEPARTMENT OF PLANNING AND DEVELOPMENT

Cascading waterfalls are a feature of the North Grey Region and Jones Falls, where the Pottawatomi River tumbles over the escarpment, is particularly attractive with a "staircase" of curved rock.

DEPARTMENT OF PLANNING AND DEVELOPMENT

HON. W. M. NICKLE, Q.C.
Minister

T. A. C. TYRRELL
Deputy Minister

A. H. RICHARDSON
Chief Conservation Engineer

NORTH GREY REGION CONSERVATION REPORT

1959

ONTARIO

TORONTO
1959

Two hundred copies of this
report have been prepared, of
which this is
Number 111

Honourable W. M. Nickle, Minister,

Department of Planning and Development

Parliament Buildings,

Toronto, Ontario.

Honourable Sir:

I take pleasure in transmitting herewith the complete Conservation Report for the North Grey Region.

The report covers History, Land, Forests, Water, Wildlife and Recreation.

Yours very truly,

A. H. Richardson
Chief Conservation Engineer

Toronto, December 21, 1959.

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Grateful acknowledgement is made of the co-operation received from the staffs of the Ontario Department of Lands and Forests, and Agriculture, and of the assistance of Mr. Leslie Beamer of Meaford who provided the chief data for the list of birds of the Region.

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INTRODUCTION

Conservation has long been a subject of concern to the people of Ontario. This concern had to do originally with the protection of forests because of their importance as a source of revenue to the Province; but allied with this was the problem of wildlife management and the protection of source areas of rivers and streams. In Southern Ontario interest in conservation was indicated first by reforestation and woodlot management, but more recently this has broadened out to include flood and pollution control, improved land use and provision for recreation facilities.

While the progress in these activities has been steady up to the present, most of the programs heretofore were initiated by government departments. Recently, however, there has been a growing conception of personal obligation, especially where land use problems, farm ponds and small reforestation projects are concerned. On the other hand, control of flooding, summer flow and pollution; large reforestation projects; and recreation areas have come to be considered the responsibility of the community - the community in this case being the river valley.

With the advent of this new concept of personal and community responsibility in conservation, the Authorities movement was born, and the willingness of our people to undertake conservation in this way is indicated by the fact that in the last thirteen years 27 Authorities have been established, with a total membership of 375 municipalities and an area of 16,021 square miles.

The first step in establishing a Conservation Authority is undertaken by all the municipalities wholly or partly within a watershed. Two such municipalities must first by resolution petition the Government to call a meeting for the purpose of ascertaining whether or not an Authority should be established. Two-thirds of the number of representatives

which the municipalities are entitled to appoint (on a population basis) must be present to make the meeting legal. If two-thirds of those present vote in favour of establishing an Authority a resolution is forwarded to the Government. The Authority is then established by Order-in-Council and under the Act becomes a body corporate, including representatives from all the municipalities in the watershed.

While some Authorities were brought into being because of flooding within their areas, all were aware of the necessity of carrying out such supplementary measures as improved methods of land use, reforestation, proper woodlot management, prevention of pollution, investigation of underground water supplies, wildlife studies and recreation. But the Authorities were not equipped to carry out the extensive investigations that would indicate where such work should be done. Consequently the Conservation Branch of the Department of Planning and Development undertook to carry out the preliminary investigations as a service to the Authorities, to appraise, by means of surveys and reports, the conservation needs of each watershed, and to submit to the Authority a detailed report outlining the conservation measures that should be implemented.

The survey work is grouped under five general headings, namely, Land Use, Forestry, Water, Wildlife, and Recreation. The scope of the studies made in each of these subjects varies with the condition and needs of the area under investigation. In addition to the five topics indicated above, a study of the history of the area is made. This serves as a backdrop to all the conservation problems of the watershed and compels the reader to understand the abuses of the past and the need for a diversified program in the future.

The starting point for all surveys is aerial photography. Before the survey is commenced in the field all such contributing data as maps, old records, photographs,

unpublished reports and other useful information are thoroughly explored and recorded. While the survey is in progress similar data are gathered locally, and agricultural representatives, zone foresters, municipal clerks and other officials and private citizens are interviewed for additional material.

The results of these conservation surveys, together with the recommendations based upon them, are set down in the reports presented to the Authorities and intended to serve them as a blueprint. The carrying out of any scheme is not the work of the Conservation Branch of the Department of Planning and Development, because it is not an operating department. Its active participation for the most part ceases when the planning is complete and the report is submitted, although it stands by to interpret the report and give advice and assistance in carrying out the plans recommended in the report. The Authority must assume responsibility for initiating the schemes which it considers most urgent; it must also make approaches to the government departments or other bodies from which it hopes to get assistance.

If, for example, an Authority undertakes a scheme having to do with land use, it must seek assistance from the Department of Agriculture; if it involves a forestry or wildlife problem, then the Department of Lands and Forests is approached. In the case of flood control, however, as there is no department of the Government doing hydraulic surveys except the Conservation Branch, whose staff is not large enough to carry through the engineering works of several Authorities, the Authority must engage a consulting engineer to do the final engineering and designing and to carry the work through the construction stage. Similarly, where an Authority undertakes a scheme which has to do with recreation, it may have to employ men specially trained in this work.

As the work being done by Authorities is a new approach to the conservation problem, in that the responsibility of carrying it out is left entirely in the hands of the

Authority concerned, much directing and assistance have been necessary from the Conservation Branch and, in the case of 20 Authorities including the North Grey Region, a member of the staff of the Department of Planning and Development has been assigned to work in the watershed.

The North Grey Region Conservation Authority was established by Order-in-Council on June, 5, 1957, following an organization meeting which was held at the Town Hall, Meaford, on April 29, 1957, when thirteen representatives out of a total of fifteen attended the meeting and ten voted in favour of establishing the Authority.

As mentioned above, the Department of Planning and Development, as a service to an Authority, undertakes to carry out a conservation survey of the valley for the guidance of the Authority, but the commencement of conservation work in the valley does not necessarily have to wait until such a survey has been made and the report presented. This has been the case with the North Grey Region Conservation Authority, where two Conservation Areas have been established, 1,491 acres of Authority Forest have been acquired and the Harrison mill dam at Owen Sound restored.

The North Grey Region Conservation Report has been prepared in sections, namely, History, Land, Forests, Water, Wildlife and Recreation, and the six sections are included in this volume.

\- A. H. RICHARDSON

RECOMMENDATIONS

RECOMMENDATIONS

STATED OR IMPLIED IN THIS REPORT

History

1. That before carrying out any project, the Authority ascertain from the Royal Ontario Museum of Archaeology whether the area concerned is likely to contain archaeological material and, if necessary, arrange for the investigation of the site before operations make this difficult or impossible.

2. That historic sites be marked, ruins preserved, buildings restored and, if suitable, used for some purpose compatible with retaining their original character.

3. That the Authority appoint an Historical Sites Advisory Board to make recommendations with regard to matters of historic interest.

Land

4. That the Authority assist in the restoration of water supplies where such restoration is needed and appears to be economically feasible. p. 3

5. That the Authority participate as much as possible in those conservation practices outlined in Chapter 5 and that it take special note of suggestions made under the several headings of this chapter.

6. That the Authority embark on a program of little valley improvement as discussed in Chapter 6, and as mentioned in the companion report on water.

7. That the Authority keep in mind the fact that its achievements will depend very largely on public goodwill and that it remember that publicity, education and example on a continuing basis are basic to achieving this goodwill. p. 70

8. That the Authority sponsor land-judging contests. p. 70

Forest

9. That the Authority encourage landowners to convert to productive forest such parts of the 17,760 acres of scrub-land as cannot economically be restored to agricultural use. p. 13

10. That the Authority act as co-sponsors for:

    (a) The Tree Farm movement p. 16

    (b) 4-H Forestry Clubs p. 18

11. That the Authority urge its member municipalities to apply The Assessment Act so as to encourage the best management of their woodlands. p. 18

12. That a North Grey Authority Forest be established and that it be expanded through a definite program of annual additions. p. 19

13. That the Authority encourage private reforestation by providing a planting service at nominal cost and by offering a planting subsidy for trees privately planted. p. 23

14. That the Authority establish woodlot improvement projects on its own properties or on private woodlots under agreements with the owners in order to demonstrate the advantages of better forestry practices. p. 25

15. That the Authority encourage and co-operate in research to find improved methods of managing plantations and natural woodlands and publicize results which would help private woodlot owners. p. 27

16. That the Authority co-operate with schools, government departments and all other groups and agencies possible to publicize the need and methods of reforestation and woodlot management; and in particular that the Authority sponsor tours, practical demonstrations and field days for this purpose. p. 28

17. That the Authority, by purchase of equipment, organization of cutting crews, or direct subsidy, encourage private owners in thinnings and improvement cuttings in their woodlots. p. 30

18. That the Authority formulate some modifications of the Halton County woodlot fencing by-law, to stimulate action toward the elemination of woodland grazing. p. 32

19. That the Authority investigate, publicize and urge the implementation of the best methods for protecting natural woodland and plantations from:

    (a) Fire. p. 34

    (b) Insects and diseases. pp. 35-38

20. That the Authority encourage the establishment of windbreaks, shelterbelts and snow fences. pp. 40 and 41

Water

21. That since Meaford harbour has suitable facilities for pleasure craft, steps should be taken to ensure that this asset is fully protected.

22. That the Authority proceed with organizing the small watershed project as shown in Figure (3). p. 32

23. That the Authority undertake streambank protection work to reduce erosion and prevent silting of the harbours. p. 34

24. That a flood warning system be established in the North Grey Region. p. 38

25. That the Authority start taking the necessary steps to remedy the flood danger points in the Region. p. 39

26. That the Authority investigate the intermittent flowing streams in the watershed with the view to restoring their headwaters, and that the farmers be encouraged to seek the advice of the Authority regarding the preservation of the

headwaters and the advisability of suggested drainage schemes. p. 42

27. That the Authority acquire lands for one or more reservoirs while the land values are reasonable. p. 43

28. That the Authority undertake the construction of the Keward Dam and Reservoir as soon as the funds become available. p. 46

29. That the Authority proceed with a long-term plan for the acquisition of suitable community pond sites. p. 56

Wildlife

30. That the Conservation Authority consider the stocking of Hungarian Partridges experimentally in the north-eastern part of the Region. pp. 10, 16

31. That the stocking of fish in the watershed be restricted to those streams which have been shown on the map accompanying this report to be suitable for the species concerned and are also able to support the numbers of fish stocked. p. 23

32. That an Advisory Board on Pollution be set up by the Conservation Authority to follow up the surveys of pollution made during this Fish and Wildlife survey, so that the Authority and the Water Resources Commission can take adequate steps to prevent further pollution of the streams for fish and wildlife. p. 27

33. That the Authority consider the improvement of one or more of the stretches of stream recommended in this report as a demonstration which landowners may follow. p. 27

Recreation

That the Authority consider the acquisition of any or all of the following areas for conservation and recreation:-

1. Beaver Valley
2. Inglis Falls
3. St. Vincent
4. Sullivan Mills
5. Rocklyn Creek
6. Pottawatomi
7. Coffin Cove
8. Mesa

NORTH GREY REGION CONSERVATION REPORT

HISTORY

ONTARIO DEPARTMENT OF PLANNING AND DEVELOPMENT

CONSERVATION BRANCH

CHAPTER 1

THE INDIANS AND THE FRENCH

Recorded history in the peninsula of Western Ontario begins with the coming of the first white men, in the year of our Lord 1615. In that year, Samuel de Champlain carried into effect the purpose he had long been planning, and visited the Ochataiguins, a tribe of "good Iroquois", whose lands bordered a great freshwater sea, many days' journey to the west of the great falls of the St. Lawrence River (Lachine Rapids). Champlain had made the acquaintance of people from this tribe in the course of their traffic with the French trading posts; he had called them Hurons, "because they wore part of their hair standing straight up like the bristles on a wild boar. Their own name was Ouendat or Wyandott.* Champlain cultivated their friendship, and promised to assist them in their wars against "the other Iroquois" (who were allied with the English); and he hoped thus to promote the fur trade between the Hurons and the French, and to convert the Hurons to Christianity.

The first white man to visit the country of the Hurons was probably Etienne Brulé, who was desirous of learning their language and customs, and whom, in 1610, Champlain had sent to spend a winter among them; and the Hurons, in exchange, had brought to Champlain one of their young men to be taken on a visit to France. In the following summer, both these young adventurers were duly returned, safe and sound, to their own people. Brulé informed Champlain "of all he had seen and learned during the winter, from the savages"; and the Huron went back to his own people, "giving me to understand that he was about to live a very irksome life in comparison with that which he had led in France".

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* James C.C. The Downfall of the Huron Nation. Ontario Historical Society, Papers & Records, VIII: 314, 1908. According to Harrap's Dictionary, the word "hure" means: (a) a shaggy, tousled head; (b) the head of a boar.

Before setting out on his fifth voyage to New France, in the year 1615, Champlain declared his intention of extending his travels, "to continue the exploration of the country, to learn the language, and form relations and friendships with the leading men of the villages and tribes, as well for the glory of God as for the renown of the French." *

> "I exerted myself to find some good friars, with zeal and affection for the glory of God, that I might persuade them to send some one, or go themselves, with me to these countries, and try to plant there the faith."†

Accordingly, when Champlain sailed from the port of Honfleur, on April 24, 1615, he was accompanied by four Fathers of the order of Recollects, the "Reformed Franciscans", who, with considerable difficulty, had obtained permission to undertake "this holy enterprise". On their arrival at Quebec, one of these, Father Joseph le Caron, pushed on immediately to the post at the great falls, "where he saw all the savages and their mode of life", and whence, in July of the same year, he set out for the country of the Hurons, accompanied by "twelve Frenchmen, who had been furnished to assist the savages", that is, in their wars against the Iroquois. Thus, when Champlain himself, a month later, came into the Huron villages for the first time, he was met and welcomed by this band of his own people.

Leaving to Father le Caron the task of winning the savages to Christianity, Champlain, in September 1615, accompanied a war party of the Hurons on an expedition against the Oneidas, a tribe of the Iroquois. The expedition ended in disaster for the Hurons. Champlain had despatched Etienne Brulé

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* Voyages of Samuel de Champlain, 1604-1618. New York, 1952. Page 269.

† Ibid., page 270.

to enlist the aid of the Andastes, a nation dwelling near the headwaters of the Susquehanna River in the present State of Pennsylvania, but the Andastes deliberated too long; their warriors arrived too late in the Oneida country. Champlain was wounded and his Hurons suffered a humiliating defeat. Withdrawing to the north shore of Lake Ontario, they waited for the lakes and swamps to freeze; and finally reached their own villages in late December. Champlain remained with them through the winter.

From the western shores of the Penetang peninsula one could look out across the waters of Nottawasaga Bay to where the massive outline of the Blue Mountain showed like a barrier against the setting sun. In the shadow of that mountain, Champlain learned, lay the villages of the Tobacco Indians; and beyond it was a variety of other tribes, friendly to the Hurons, whose territory reached to the great "Mer Douce", the Freshwater Sea, still farther to the west. "The Tobacco Nation was so called because they were growers of that article. Their Indian name was Tionnantates, their French name Petun." Champlain determined to visit them.

Accordingly, in January 1616, Champlain and le Caron, accompanied by Etienne Brulé as interpreter, set out on a visit to the land of the Petuns, and this is, so far as the records show, the first time that white men set foot in the country that is now the County of Grey. There is no record of the course of their travels but the journal tells something of the Petun mode of life. The Petuns were an agricultural people living in fixed abodes, and Champlain visited seven villages. They lived at peace with Huron and Algonquin neighbours and had attained a much higher point of wealth, prosperity and civilization than their neighbours, and cultivated corn and tobacco.

After visiting the Petuns, Champlain went to a nation of savages, which he named Cheveux Relevés because their

hair was arranged high on their heads. These people were clean, well dressed, and welcomed Champlain with open arms. They were warriors, hunters and fishermen, and lived by trading with their neighbours.

In May, 1616, Champlain returned to Quebec. He left behind him in the west a situation tense with the rancour of smouldering rivalry that was thirty years later to break out into a savage war of extermination. Champlain's share in the Huron expedition against the Iroquois had stirred in the latter a sense of bitter hostility. The Huron monopoly of the fur trade and the increasing scarcity of beaver furs in the Iroquois country brought dissatisfaction and hatred into the Iroquois councils. Their efforts to persuade the Hurons to share the fur trade proved ineffectual. The trade increased, the Hurons prospered, and the Iroquois determined grimly to destroy the Hurons.

The storm of Iroquois fury broke out in the winter of 1648-49, when "a large band of enemy warriors infiltrated into the Huron country and with masterly strategy isolated and destroyed the settlements one after another."* In vain the French missionaries sought to show the Hurons their danger and to persuade them to prepare their defences. The Hurons lacked the political acumen of their enemies; they not only failed to match and meet the strategy of the Iroquois, but even, by ill-advised and ill-directed raids on the country of the Ojibway (Chippewa) and Ottawa tribes, estranged those that were by tradition and treaty their friends.

By 1649 the Iroquois had completely devastated the Huron country and had driven the remnants of the Hurons and all their allies out of the Huron peninsula. After dispersing

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* Kidd, K. E. The Excavation of Ste. Marie I, page 13.

the Hurons, the Iroquois then turned their attention to the Tobacco Indians and the Eries, and in twenty-five years completely wiped out these tribes.

On the maps of the ensuing century the former Huron country is designated merely "the beaver hunting grounds of the Iroquois". The wretched remnants of the Hurons fled across Georgian Bay to the country about Lake Superior, and appealed to their ancient allies the Ojibways and the Ottawas for assistance and revenge. The Ojibways listened, remembered their grievances, and were not persuaded.

While the exiled Hurons continued to plead their unpromising cause with the Ojibway chiefs, the Ojibway hunters prosecuted a lively trade in furs with the French at Montreal. About the year 1652, the Iroquois, who resented the protection that the Ojibways had extended to the Hurons, attacked and murdered several Ojibway trading parties at various points along the French River-Ottawa line of communication. The Hurons seized the occasion to renew their arguments for revenge against the implacable Iroquois. The immediate result, however, was not war, but a Council of Peace, in which Ojibways met Iroquois in Iroquois country at the mouth of the Saugeen River, and there concluded a treaty of peace, which the Iroquois did not intend to keep.

At this time the Hurons began to accompany the Ojibway traders to Montreal. This became added provocation to the Iroquois who saw "that the French were more friendly to the Indians of Lake Superior than they were to them; and that the Ojibways were a protection to those by whom they were formerly molested". The treaty was broken, and once again the Iroquois attacked a party of traders on the Ottawa River.

What the Hurons had been unable to achieve by their persuasions, the Iroquois had brought about by their

perfidy. The Ojibways determined to make a war to the death against the Iroquois; and the remaining Hurons welcomed the opportunity to seek revenge. To a dozen tribes the call went out, dwellers by the shores of Lake Superior, Huron, and Michigan; and from the north and west and south the allies of the Ojibways answered the call. When all was ready, a fleet of no less than seven hundred war canoes gathered on Lake Huron and struck the enemy with overwhelming force.

The first fierce battle took place ironically enough, at the mouth of the Saugeen River, at the scene of that Council of Peace where the treaty had been concluded whose violation was the cause of the war. It was now the turn of the Ojibways to carry raid after raid into the Iroquois' country. Battles were fought on Lake Simcoe, at Rice Lake, at Mud Lake, at Pigeon Lake, and at the mouth of the River Trent. This was another "war of extermination", and with varying intensity it continued through nearly forty years. Indian wars on a large scale were no swift campaigns. They had a beginning, but no apparent end.

The Ojibway-Iroquois war could not be waged apart from the alliances of the contestants with the French and the English. Denonville, the Governor of Canada, proposed in 1686 the establishment of two French posts, one at Detroit and the other at Toronto: "Those two posts will block the passage against the English should they attempt to go again to Michilimaquina, and serve as retreats for our Indian allies either while hunting, or while making war against the Iroquois". Governor Dongan, of New York, sent a succession of trading expeditions, "with a large party of sixty men", to buy furs at "Missilimakina", and the French disarmed the second of these expeditions and allowed the Indians and French to pillage their goods. So far as the present province of Ontario was concerned, hostilities

came to at least a temporary end in 1687, when Denonville led a war party of some four hundred canoes against the Senecas, cleared the north shore of Lake Ontario of the last of the "castles" of the Iroquois, and built a fort at the mouth of the Niagara River.

Between the French and the English, and between their respective allies, the struggle went on; but in this struggle the Huron peninsula no longer played a conspicuous part. The events of the eighteenth century affected Boston, New York, Quebec, Montreal, Albany, Niagara and Detroit; but from the former "beaver hunting grounds of the Iroquois" there were no reports and no news. Even the fall of Quebec in 1759, and the ensuing transfer of all French territory in Canada to the English, gave no occasion for any mention of the remote region between Georgian Bay and Lake Huron. When this part of the country reappears in written records, we find it occupied by settled bands of Ojibway (Chippewa) Indians, or of their allies, the Missisaugas, the Pottawatamies, and the Ottawas. The tribal wars of the Indians had passed, some into legend, some into history; and an era of permanent occupation, settlement and survey by the "English" of Upper Canada had begun.

CHAPTER 2

SURVEY AND SETTLEMENT

In 1791 Canada was divided into the two provinces of Upper and Lower Canada. By a proclamation dated July 16, 1792, Lieutenant-Governor John Graves Simcoe authorized the formation of nineteen counties in Upper Canada, and provided for their representation in the assembly of the province. Within the next ten years, the lands bordering the St. Lawrence River, Lake Ontario, and Lake Erie had been laid out in more than one hundred townships, surveyed in the chequerboard pattern that the Government had adopted. The significance of Lake Huron as the western boundary of Upper Canada was recognized, and communicication with its vast extent had been established by way of Lake Simcoe and Georgian Bay, as well as by way of Lake St. Clair. Of the lands that lay between Burlington Bay and Lake Huron vast areas remained unknown until after 1820. In 1792, the surveyor Augustus Jones carried an exploratory expedition into the country traversed by branches of the Grand River, with instructions to run a line "from the outlet of Burlington Bay, W. end of Lake Ontario, to the River Thames, formerly called the River La Tranche", a line that was intended to form part of the northern boundary of a purchase of lands from the Mississauga Indians, but which proved to be geographically impossible. His course was to be north-west; after running on this course for a distance of fifty miles to a point a few miles south of the town of Arthur, he was convinced that his line would never strike the Thames. He turned south-west, then south, until he finally reached the Thames at a point nine miles north of Woodstock. This roundabout line was established December 7, 1792, as the boundary of the purchase.

By an Act passed in 1798, which was given Royal Assent in 1800, numerous changes were made in the lines bounding

the counties and districts of the province. The County of Simcoe was formed; and part of its western boundary was defined as

> "a line produced due north from a certain fixed boundary (at the distance of about fifty miles north-west from the outlet of Burlington Bay) till it intersects the northern limits of the Province".

By the same Act, the County of Simcoe was to form part of the Home District; and the lands lying to the westward of the Home District were to constitute part of the London District.

The "line produced due north" (by the magnetic needle) from the fifty-mile mark on Jones' north-west line from Burlington Bay, may be traced today, forming the boundary between the townships of West Luther, Proton, Artemesia, Euphrasia and St. Vincent, on the east, and Arthur, Egremont, Glenelg, Holland, and Sydenham, on the west. According to present-day maps, this boundary line lies on a course about nine degrees to the west of True North; the line divides the County of Grey into two nearly equal parts.

In 1798, all that constitutes the present county of Grey was Indian land. Twenty years later, on October 17, 1818, the Deputy Superintendent General of Indian Affairs, William Claus, met with the chiefs and principal men of the Chippewa Tribe of Indians in the Township of King, and entered into an agreement for the purchase of a tract which lay in the County of Simcoe, on the east side of the "due north" line.

The part of the London District that lay on the westerly side of the "due north" line remained Saugeen territory until 1836. On August 9th, of that year, the Lieutenant-Governor, Sir Francis Bond Head met on Manitoulin Island with the Chiefs of the Ottawas, Chippewas, and Saugeens and, having first obtained the consent of the Ottawas and Chippewas to his proposal to make

Round-log house in the Beaver Valley north of Kimberley is typical of the cabins built by settlers as a first permanent house.

This house of logs "dressed on two sides" is much later than the one above. The rough construction indicates an intention to board it over almost at once.

Squared-timber house at Bognor in Sydenham Township built after 1861. The higher wall has been pierced with low windows to light the half-storey.

"these islands* the property of all Indians whom he shall allow to reside on them", he proceeded to address the Saugeens.

His address, duly written on paper, and signed at Manitowaning on August 9, 1836, by Sir Francis Bond Head, and by four representatives of the Saugeen Indians, was the instrument by which about a million acres of land was surrendered to the Crown. Part of this surrender became, fifteen years later, the westerly half of the County of Grey.

By an Act passed in 1837, promulgated in 1838, the Townships of Proton, Luther, Melancthon and Amaranth were taken from the County of Simcoe, and united with Garafraxa, Erin, Eramosa, Guelph, Nichol, Waterloo, Wilmot and Woolwich Townships, together with certain other lands not clearly defined in the Act, and erected into a new District, to be called the District of Wellington.

In 1845, the District of Wellington was defined as being identical in extent with the County of Waterloo - "Which shall include and consist of the Townships of Arthur, Amaranth, Bentinck, Derby, Eramosa, Egremont, Guelph, Glenelg, Garafraxa, Holland, Luther, Mornington, Minto, Maryborough, Melancthon, Normanby, Nichol, Peel, Proton, Puslinch, Sydenham, Sullivan, Waterloo, Wilmot, Woolwich and Wellesley, and for the purpose of representation in the Legislative Assembly only, the Township of Dumfries, and for all purposes except that of representation in the Legislative Assembly, the Township of Erin."†

The territorial divisions known as Districts were abolished in 1849; and the Act by which their "proceedings"

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* Manitoulin Island, then supposed to be composed of several distinct islands.

† Statutes of Canada, 1845; 8 Victoria, Cap. 7: Feb.10,1845.

were transferred to the counties, recited the names of those townships that composed the several counties concerned. Waterloo County was defined as consisting of the same townships as in the previous Act, except that, in 1849, the Township of Erin was fully included, and the Township of Dumfries was not included at all.

Partly out of the neighbouring County of Simcoe and partly out of the County of Waterloo, the great extent of which was becoming increasingly cumbersome and inconvenient, was carved the new County of Grey. The Act by which this change was made, known as "14 Victoria, Cap. 5", was passed, August 2, 1851, to have "force and effect upon, from and after the first day of January next", that is, 1852. It is called "An Act to make certain alterations in the Territorial Divisions of Upper Canada"; and the composition of Grey County is set forth in its "Schedule A", paragraph 28:

> "The County of Grey shall consist of the Townships of Derby, Sydenham, Saint Vincent, Sullivan, Holland, Euphrasia, Collingwood, Bentinck, Glenelg, Artemesia, Osprey, Normanby, Egremont, Proton and Melancthon, together with that portion of the Peninsular Tract of Land known as the Indian Reserve, and situated between a line drawn northward from the north-east angle of Arran and the north-west angle of Derby until it strikes Colpoy's Bay on the east side of the Indian Village, and the waters of Georgian Bay, together with the Islands contiguous thereto."

According to Schedules B and C of the same Act, the Counties of Waterloo, Wellington and Grey were to be united for Municipal, Judicial, "and other purposes", and for the purpose of representation.

One further change was to be made to the limits of the County of Grey. When, in 1874, provision was made for the erection of the County of Dufferin, the Township of Melancthon was taken from Grey County and added to Dufferin. Of the sixteen present-day townships of Grey County (including Keppel and Sarawak, formed from the "Peninsular Tract"), nine are wholly or partly within the watersheds of the rivers of the North Grey

Region. These nine townships are: Artemesia, Collingwood, Derby, Euphrasia, Holland, Osprey, St. Vincent, Sullivan and Sydenham.

The first two of these townships to be surveyed were Collingwood and St. Vincent, then called Alta and Zero. In 1833, Deputy Surveyor Charles Rankin was engaged in the survey of the townships of Sunnidale and Nottawasaga (the latter being formed by uniting two townships previously known as Merlin and Java); his instructions were dated at the office of the Surveyor-General, March 23, 1833. In August of the same year, Rankin, having already carried out the first part of his instructions, wrote from Penetanguishene to the Surveyor-General, indicating that he took the reference to Alta & Zero for an order to complete their survey. From August to December, Rankin was employed upon the survey of the two townships. He made his returns and submitted his report on December 16, 1833. His account of the townships of Collingwood and St. Vincent describes them as being like Nottawasaga, with excellent soil and timber consisting of maple, basswood, beech and elm. They are well supplied with streams of pure water arising in the escarpment. Between the escarpment and the shore is a hard gravelly flat suitable for a road from Sunnidale Township to St. Vincent Township. He describes a river in each, evidently the Bighead and the Beaver, the mouths of which afford good harbours, and he states that there are mill sites in abundance.

Collingwood Township

During his survey of the Townships of Collingwood and St. Vincent Rankin made his home in a log house he had built at Lora Bay; and so it is said of him that he was the first settler in the Township of Collingwood, formerly Alta. A few years later, in 1837, "having paid £17.6s.6d, he received a patent for Lot 38, Concession XI, containing 66 acres; and in 1841, for the sum of£29.10s. a patent for Lot 37, in the same concession, 118 acres.

Apart from Rankin, whose work as a surveyor put him in a somewhat different class from his neighbours, the earliest settler is said to have been Augustus Bezer, who took up his land in the vicinity of Craigleith. Bezer, whose home was in Portland Township, had been employed as a sawyer in the dockyard at Kingston during the war of 1812. In 1834, he petitioned for the grant of land which artisans in that service were entitledto,and,on June 20, 1836, he received his patent for 200 acres, being Lot 23, in the fourth concession of Collingwood.

According to the records of the Patent Office, Department of Lands and Forests, 380 grants of land in Collingwood Township were made to claimants in the following categories.

Sons of U. E. Loyalists	61
Daughters of Loyalists	44
Officers, Royal Navy	10
Seamen, Royal Navy	3
Officers, Army and Marines	11
Sergeants	6
Privates, or equivalent rank, Army	41
Dockyard Artificers	13
Commissariat Clerk	1
Inspector of Ordnance Hospitals	1
Son of Superintendent Indian Affairs	1
Captain, East India Company	1
Emigrant Settlers	3
Unspecified	3
Cash payment, Crown Land Sales	181
	380

Following its survey in 1833, the beginnings of settlement in Collingwood Township proceeded very rapidly. In 1836, one-quarter of the lots had been patented, and by 1839, only six years after the survey, more than half of the township was occupied, and patents had been issued for 50.4 per cent of the grants. What then remained ungranted proved to be less desirable land, and the progress of settlement became slower; not until 1863, thirty years after the survey, did the township pass its three-quarter mark, and in 1875, of a total of 438 lots, there remained 38, or 9 per cent of the township, still unpatented.

One of the early settlers in Collingwood Township was John Moberly, a Captain in the Royal Navy, who, after thirty-two years' service, had settled first in Oro Township. In 1837,

Captain Moberly received his patent for Lot No.12, in the first concession of Collingwood. According to the Historical Sketch of Grey County, published in 1880, it was through the influence of Captain Moberly that the name of the township was changed from "Alta" to "Collingwood", and the name of "Zero" to "St. Vincent".

St. Vincent Township

Though the Township of St. Vincent was surveyed in the same year as the Township of Collingwood, the early settlement of St. Vincent proceeded more slowly than that of its sister township. One reason for this difference is that Collingwood lay further to the eastward, and settlers coming from Barrie and Sunnidale arrived first in Collingwood Township, and, so far as the land pleased them, they were content to remain. Later arrivals had to seek farther.

Another reason for the slower settlement of St. Vincent lay in the adoption of a settlement plan in part of the township, which became a matter of discord, controversy and ill-feeling, and which, before the affairs of the township could proceed satisfactorily, required a considerable degree of Government investigation and intervention. The centre of this controversy and ill-feeling was a promoter named Price Mallory who was said to be a land agent authorized by the Government to bring settlers into St. Vincent Township.

In the month of August, 1834, Price Mallory and about fifty others associated with him, said to be residents of the District of Johnstown (Leeds, Grenville and Carleton Counties), who were desirous of settling together upon a tract of land in the Township of St. Vincent, and also said to be entitled to grants of land as sons and daughters of U. E. Loyalists, petitioned the Lieutenant-Governor, Sir John Colborne, asking that the survey of St. Vincent should be completed, that a part of the township lying north of Lot No. 21, and from the shores of Nottawasaga Bay westward to the western boundary of the

township,"might be assigned over to him and associates upon condition of actual and permanent settlement thereon". The petition also asked that the Crown and Clergy Reserves that lay within this tract might be removed to other parts of the township. When the Commissioner of Crown Lands was asked to report upon this petition, he recommended the granting of some, but not all, of its prayer.

The particulars of grants in St. Vincent Township that are contained in the records of the Patent Office serve to identify only sixteen lots as having in some way passed through the hands of Price Mallory. In a letter to the Commissioner of Crown Lands, dated September 1, 1835, Mr. Rankin, the surveyor, stated that Mallory with some of his settlers had lately gone to St. Vincent, where they would require some assistance in order to determine which lots they were to occupy.

It was not long before complaints began to be made by settlers in St. Vincent: Price Mallory's character, and the methods by which he assigned land to his associates came under criticism. The Government sent a surveyor, Wellesley Richey, to investigate and report. Richey's inspection, made in November and December, 1836, showed thirty-eight lots as being occupied by authority of Price Mallory. His report provided no evidence of any irregularities, and did not even hint at any impropriety in Mallory's activities. Mallory himself was reported as living on broken-front lot No. 22, in the 6th Concession, where he had been resident fourteen months.

About a month later, in a letter dated January 4, 1837, Charles Rankin complained of certain false charges that Price Mallory had brought against him. Without stating what those charges were, Rankin referred to them as "charges of 'unjust and indelicate' conduct".

One of Price Mallory's associates was his father, Lemuel Mallory. It appeared that Lemuel Mallory, many years

Abandoned and used as a shed, this small limestone school bears the date 1865 over its blocked door and is the oldest dated schoolhouse found in the area.

This fieldstone school north of Annan is dated 1867 and is a fine example of the type.

The curious plan of this larger brick school in Clarksburg may result from doubling the accommodation of an earlier building.

earlier, had been granted the right to 200 acres of land by the Land Board of the Lunenburg District (in which Leeds County was then included); and that this right had never been located. In February, 1836, his father having died, Price Mallory asked permission to locate that claim in his father's name; and when the permission was granted, proceeded to locate it in the broken-front lots Nos. 19 and 20, in the 6th Concession of St. Vincent, upon which he built, first a sawmill, and later a makeshift grist mill. These are further discussed in a later chapter.

Toward the end of the year 1836, the Minutes of the Executive Council contained evidence of a growing feeling that Price Mallory might prove to be a more than ordinarily difficult person to deal with. Mallory appears to have engaged in activities that were speculative in character, and in deals in lands that had been patented and were accordingly free from the restrictions that the Government imposed on Crown Lands.

The Minutes of the Executive Council, dated October 28, 1841, contained a lengthy report brought in by a committee of that Council, in which Price Mallory's affairs were examined in considerable detail. Certain "Inhabitants of the Township of St. Vincent" had addressed to the Government a petition "complaining that much discontent and disturbance has originated to the great detriment of the Settlers in Mallory's tract", and that "Encroachments on the rights and privileges of the Settlers have impeded the progress of the Settlement". The petitioners showed by the language they employed that their understanding of Mallory's activities was not in accordance with the views of those activities taken by the Government. The Committee was at some pains to set them right.

Finally, in a letter from the Surveyor-General to Mr. John Doherty, of St. Vincent, dated December 23, 1841, a warning was issued to the settlers of that township, against the operations of Mr. Mallory.

These censures had the effect of checking Mallory's attempts to deal in Government lands; but they appear not to have

curbed his activities as a speculator. He was thereafter a dealer in private lands; in buying the holdings of absentee proprietors and disposing of them to land-hungry settlers, Price Mallory seems to have found abundant scope for his genius as a trader, and a profitable field in legitimate speculation.

While the settlement of St. Vincent Township was in progress the Government had to deal with the petitions of a considerable number of settlers who had taken lands in other parts of the province, and had found their lots unfit for cultivation. One part of these applications came from the occupiers of lots in the townships of Bathurst, Dalhousie and Lanark, in the County of Lanark, who were referred to as the Lanark settlers. Upon their surrendering their patents to the lands in Lanark, they received equivalent grants of lands elsewhere. Six such settlers are shown in the Patent List of St. Vincent Township.

Another class of settlers who were given "compensation grants" in St. Vincent were those who had originally occupied lots bordering the Bay of Quinte. These settlers in the Township of Sophiasburgh, had been compelled to give up their lots when part of the "First Concession of Sophiasburgh Produced" had been re-surveyed and annexed to the townships of Ameliasburgh and Hallowell. They were offered, in exchange for a 200-acre lot, a choice of 400 acres in Moore or Sarnia Township, or 800 acres in St. Vincent; nine such displaced settlers elected to receive their lands in St. Vincent. "I think it would be objectionable", wrote the Surveyor-General, John Macaulay, "to exceed these limits, unless some peculiar reason should exist for a deviation".

The progress of patenting in St. Vincent Township is shown by the following tabulation:

In 1838	25% patented
In 1848	50% patented
In 1861	75% patented

C2092|60

COPY OF NOTICE

Issued by order of the Hon. R. B. Sullivan, 1st November, 1840.

FOR THE GUIDANCE OF

PERSONS DESIROUS OF SETTLING AT THE OWEN'S SOUND SETTLEMENT.

Crown Land Department,
KINGSTON, 18TH MAY, 1842.

Notice is hereby given, that a road through the Crown Land from the North West angle of the Township of Garrafraxa to Owen's Sound, upon Lake Huron, is opening at the expense of Government.

Lots of 50 acres of land each, will be laid out on each side of the road.

Settlers who have never obtained a Grant of land from Government, may obtain a Lot of 50 acres on the following conditions:—

1st.—They are to make application to the Commissioner of Crown Lands, or to the Agent on the ground, whenever they shall be ready to become resident, on the tract to be granted.

2nd.—Upon giving a satisfactory account of their means of providing for themselves, until a crop can be raised from the ground, they will receive a Ticket from the Commissioner at the Crown Land's Office entitling them to locate the land.

3rdly.—Upon application to the Agent in the first place, he will forward a statement to the Crown Land's Office, of the applicant's age, family and means of settlement, upon which, if approved, authority for location will issue.

4thly.—The Tickets issued will be useless to any but the applicants, and unless presented to the Agent within one month, from the date, they will not be received by him. Any person who shall receive a Ticket, and who shall not proceed to the Settlement within one month; or who having been placed upon land there, shall abandon it, will be considered as having lost all claim to receive land.

5thly.—Settlers will be required to clear, and place once under crop, one-third of the land located, and to reside on the land until this Settlement duty is performed, and after one-third of the Grant shall have been cleared and under crop, the settler shall be entitled to his Patent, free of expense.

6thly.—The Settlement duty is required to be done within four years, from the date of the ticket.

7thly.—Settlers who are under the necessity of being temporarily absent from their Locations, will apply to the resident Agent, stating the length of their intended absence, and the reason for it, which will be entered on the Agent's book, if the reason for absence seems sufficient; and any person who shall absent himself, without being permitted to do so, by the Agent; or who shall remain away from the Settlement, for a longer time than such permission shall authorize, will be considered as having forfeited his location.

8thly.—An assignment, or attempt to assign any Ticket, or Location, will also be considered as a forfeiture of all right in the Locatee or the Assignee; or if it shall appear that the Locatee has previously obtained a Grant of land from Government, his new Location shall be forfeited.

9thly.—In all cases of abandonment of Location, the located land will be considered immediately open for new location or sale.

10thly.—As it is not the intention of the Government to offer the settlers any assistance, further than the free Grant of land, and the opening of the road, applicants are specially desired to consider for themselves, whether or not, they have the means of maintaining themselves and their families, until crops can be raised from the ground.

Government Agents have been appointed at the Northern and Southern extremities of the Settlement, and further information may be obtained on application to Mr. JOHN TELFER, Owen's Sound, and Capt. DURNFORD, Arthur.

JOHN DAVIDSON,
COMMISSIONER OF CROWN LANDS.

Grants in St. Vincent, according to the Patent Office, number 419, and are distributed among the following categories:

U. E. Loyalists	2
Sons of U. E. Loyalists	52
Daughters of Loyalists	37
Officers, Royal Navy	7
Seaman, Royal Navy	1
Officers, Army and Marines	12
Non-commissioned Officers	6
Privates, or equivalent rank, Army	57
Dockyard Artificers	3
Lanark Settlers	6
Compensation claims	9
Commissariat Clerk	1
Emigrant Settlers, general	17
Emigrant Settlers, from Scotland, 1815	8
Unspecified	8
Cash payment, Crown Land Sales	193
	419

Euphrasia Township

After the survey of the Townships of Collingwood and St. Vincent, nearly three years elapsed before Euphrasia was laid out. A reference was contained in a letter written by Charles Rankin in 1835, showing that the survey of Euphrasia was at that time in contemplation; and, in a letter to the Crown Lands Commissioner, dated October 29, 1835, Mr. S. P. Hurd, the Surveyor-General, proposed

> "that the Townships of Uphrasy Artemesia and Proton be forthwith surveyed and made applicable to the Locations of the Claimants for Land specially alluded to [U. E. Loyalist and Militia Claims]".

Euphrasia Township was surveyed by Rankin, in 1836, "by order of His Excellency the Lieutenant-Governor in Council of the 7th April last", that is, 1836; but no letter of instructions addressed to the surveyor has been found. On the 21st of September in the same year, Rankin submitted his report of the completion of the survey. The report described the township of Euphrasia in general as being a good tract of land with the soil mostly yellow loam though it is poorly supplied with water, and he optimistically states that a sufficient supply of mill sites will doubtless be found on the various little streams. He points out that the inhabitants of St. Vincent are very awkwardly placed

Ruins of John Walter's first grist mill, built in 1850 on Lot 30, Concession X, Euphrasia Township.

Former blacksmith and wagon-maker's shop in Kimberley.

Former "sash and door" factory or planing mill in Heathcote in the Beaver Valley.

because the Townships of Collingwood and Nottawasaga to the east have fallen into the hands of speculators not settlers, and these townships are undeveloped, with virtually no roads. He is afraid that the same thing may happen in Euphrasia and recommends that the township, or the northern part at least, should be kept for actual settlers only. If it is impossible for political reasons to restrict the grant of land to settlers, he recommends that not over 10,000 acres be allotted to speculators.

To what extent the Government heeded the suggestions of Mr. Rankin is not clear. As settlement progressed, the records show that there were in Euphrasia 31 grants of land in excess of 200 acres, and that the total quantity of land in the township so granted amounted to 17,866 acres, or about 25 per cent of the whole, as follows:

266 acres	1 grant
400 acres	14 grants
600 acres	10 grants
800 acres	3 grants
1000 acres	1 grant
1200 acres	1 grant
1400 acres	1 grant

The greater part of the land granted in large blocks went into the hands of the Canada Company, and was, at least in part, compensation for lands that that company had surrendered elsewhere. One lot, containing 266 acres, was granted to Kings College, as part of the endowment of that institution. Nine grants, totalling 3,800 acres, were (together with numerous smaller parcels) bought by William Proudfoot, of Toronto, as part of his extensive timber holdings. Three other parcels, of 400 acres each, were bought by D'Arcy Boulton, Andrew Heron, and John Kirkpatrick. In no instance did any of the "large grants" go to satisfy the kind of claims that Rankin had referred to: "claimants to whom the Government may deem itself bound to make grants without the condition of actual Settlement". There were, in fact, in Euphrasia, no grants at all to Loyalists or to sons and daughters of Loyalists; and no grants at all to military or

militia claimants. Apart from twelve grants, none of which was in excess of 200 acres, the entire township was divided between grants to the Canada Company and grants to individual purchasers of Crown Lands.

Grants to the Canada Company	88
Grants to Kings College	4
Grants in compensation for surrenders elsewhere	5
Grants unspecified	2
Half-lot apparently unpatented	1
Grants to purchasers of Crown Lands	385
	485

It will be seen that the pattern of settlement was very different from that found in Collingwood and St. Vincent Townships. The rate of patenting is shown in the following tabulation:

In 1848 .... 25% patented
In 1854 .... 50% patented
In 1867 .... 75% patented

The grants to the Canada Company in Euphrasia amounted to a total of 16,471 acres. One of these grants, as recorded in the Patent Office, is identified as a part of "5050 acres surrendered in Dorchester & Alfred", but with no further explanation. A letter found in the Survey Records of the Department of Lands and Forests provides a possible explanation for another part of the grants, although it is not clear whether this, to any extent, overlaps the 5,050 acres mentioned in the books of the Patent Office. The letter is from Thomas Mercer Jones, of the Canada Company, addressed to the Surveyor-General, dated November 2, 1839, and requests further grants of 3,256 acres for deficiencies.

Even if there is no duplication involved, the two references cited above serve to account for only 8,250 acres of the lands granted to the Canada Company, almost exactly one-half of the total amount that the Company received.

Sydenham Township

On July 8, 1840, the Surveyor-General issued instructions to Charles Rankin to lay out a new township to the westward of St. Vincent, together with a reserve for a town at or near the head of Owen's Sound.

Rankin commenced his survey of the new Township of Sydenham on September 22, and finished November 30, 1840.

Unlike Collingwood, St. Vincent and Euphrasia, the Township of Sydenham was, from the beginning, an intrinsic part of the "Owen Sound Settlement". And the Owen Sound Settlement was an experiment, a new departure in settling new lands; and the backbone of the Owen Sound Settlement was the Owen Sound Road, sometimes called the Garafraxa Road. The principal feature of the new plan of settlement was the Free Grant of Fifty Acres.

The need for more land to accommodate the flow of settlers was urgent. At every report of the Government's readiness to open a new tract for settlement, the flood of applications was overwhelming; and it seemed that the routine procedures of purchase from the Indians, laying out into townships, and surveying into grantable lots could not keep up with the increasing demand for land. The establishing of a set of terms and conditions which would prevent large-scale speculation and ensure that the settlers would actually occupy and live upon their lands, while it would undoubtedly put a brake upon the progress of settlement, was considered necessary in order to provide a compact population, and to enable that population, without too great an effort, to open and maintain the roads beside which they dwelt.

The settlers who presently began to fill up the townships of the Owen Sound Settlement came from all the previously settled parts of the province, from neighbouring parts of the United States, and, in a few instances, from England.

The patent list of the Township of Sydenham shows that the places of origin (or residence prior to location in Sydenham) include 13 Canadian cities, towns and villages; 28 Canadian townships; two states of the United States; and England and Scotland.

The introduction of the system of Free Grants resulted in a large proportion of fifty and one-hundred-acre grants in this township. Of the former, the number of grants was 369; of the latter, 319. Twenty grants were in excess of 200 acres each.

The following table shows the numbers of individual lots and the nature of the claims by which they were granted.

Free Grant, 50-acre lots	269
Lots purchased for cash	588
For payment of taxes	1
Compensation land	1
Grants unspecified	3
Lots apparently unpatented	3
	865

As in Euphrasia, there were in Sydenham no grants in satisfaction of Loyalist or Military claims.

The rate of patenting is approximately the same as that observed in Euphrasia but actual occupation was more rapid.

In 1848 .... 25% patented
In 1851 .... 50% patented
In 1868 .... 75% patented

Derby Township

This township had its beginnings, in common with those of Sydenham, in the laying out of the Garafraxa Road, with fifty-acre Free Grant lots on each side, those on the east side of the road being in the Township of Sydenham, and those on the west side in the Township of Derby. The Instructions of July 8, 1840, from the Surveyor-General to Charles Rankin, called for the survey of "a Tract" in the vicinity of Owen's Sound,

to include "Lots on each side of the contemplated Road, giving to each a width at right angles with their side lines of 30 Chains", and a Reserve for a town plot (the present city of Owen Sound) at the end of the road. Rankin's survey of 1840, so far as the Township of Derby was concerned, consisted in laying off the required lots in the first three concessions west of the line of the Garafraxa Road. The lots were to contain 200 acres each (30 chains by 66 chains 67 links, or 120 by 266.7 rods) and, when divided lengthwise into four 50-acre lots, each lot was to have a frontage on the road of 7½ chains, or 30 rods. Such was the frontage that the settlers regarded as too narrow for efficient farming. In 1846, Rankin completed the survey of the township and made it available for general settlement.

Almost all the lots on the road were taken up as fast as they could be surveyed and thrown open. Of the 56 Free-Grant lots that resulted from the subdivision of fourteen 200-acre lots fronting on the road, more than half had been occupied and patented by the end of 1849, and 75 per cent were patented by 1852. A Gazeteer published in 1846 had very little to say about the Township of Derby as no returns had been made from it.

While it was generally true that no return has been made from the Township of Derby, as a whole, and that the greater part of the township had only lately been laid out, these comments were not applicable to the lots that fronted on the Garafraxa Road, which were regarded as a part of the "Owen Sound Settlement", rather than as a part of the township. The agent for the northern division of the Owen Sound Settlement was Mr. John Telfer, at Owen Sound (then the Village of Sydenham), whose returns, year by year, showed the progress of the settlement under his charge.

One of the early settlers in Derby was a Quaker named Nathaniel Herriman, who occupied the northern half of

Lot No. 9, in the First Concession, on the Garafraxa Road, fifty acres as a Free-Grant settler, and fifty acres by purchase from the Crown. Herriman is credited with having built the first mill in the township. The following table, compiled from Telfer's returns for 1842, 1843 and 1844, is a fair sample of the progress such a settler might make.

	1842	1843	1844
Number of acres occupied	100	100	100
Acres chopped, not cleared	8	16	6
Acres sown to wheat	-	2	10
Acres "potatoes, corn, oats &c."	-	6	4
Cattle	8	16	not reported

The returns show that Nathaniel Herriman's family consisted, in 1842, and again in 1843, of himself, his wife and his two sons, both under 16 years of age (without giving their exact age). To this number was added, in 1844, one "female under 16 years of age", presumably a new-born daughter; the sons were still "under 16", so that it seems likely that they, as young lads, may have contributed but little to the business of clearing and improving the land. In any case, Herriman's accomplishment is noteworthy. Located, probably in 1841, on one hundred acres of land, within three (or at the most four) years he had fourteen acres under crop, and a further six acres "chopped, not cleared"; in 1845 he received his two patents, one for the Free-Grant, the other for the purchased land.

The first township meeting in Derby, for the election of Councillors and other officers, was held on Monday, January 4, 1847, under warrants issued by two Justices of the Peace at Owen Sound, Richard Carney (later Owen Sound's first mayor), and John Frost.

In a settlement where white pine timber was scarce, and the more valued for its scarcity, the Township of Derby offered the early settlers the advantage of possessing "a quantity of Pine scattered through a number of Lots .... comprising about 2000 acres, not that there is that quantity of Pine, but that it is standing in Lots that will amount to that quantity of Land."*

Sullivan Township

The beginnings of settlement in the Township of Sullivan and Holland consisted of the occupation by "Free Grant" settlers of the 50-acre lots fronting on the Owen Sound Road, that had been laid out by John McDonald in 1840-41. One of these settlers, John McIntosh, a brother-in-law of William Lyon Mackenzie, had obtained the Free Grant of the third "fifty" in Lot No. 30, the last lot on that part of the Owen Sound Road that was comprised in the Township of Sullivan and which later became part of the hamlet of Dornoch. The adjacent "fifty", the second in Lot No. 30, Mr. McIntosh acquired by purchase from the Crown. As early as January 25, 1841, John McIntosh wrote to Mackenzie, giving him an account of his situation. He stated that he had 100 acres of first-quality land, that he liked the people and that there was no party animosity.

In his statistical return of the Owen's Sound Settlement for the year 1842, John Telfer showed a total of 435 souls, not counting those who had, in order to find remunerative employment, returned to the "older settlements" for the winter. By a second return, dated August 31, 1843, the number had increased to 695. The settlement was growing rapidly; and lots for granting to settlers were becoming scarce.

In April, 1843, the Commissioner of Crown Lands authorized the survey of "another Township" on the Owen Sound Road

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* Ontario Provincial Archives. Crown Land Papers, Shelf 100; Richard Carney and William C. Boyd to D. B. Papineau, Nov. 28, 1846.

in the vicinity of Sydenham". The surveyor, John S. Dennis, was ordered to lay out the Township of Sullivan.

Before Dennis had completed his survey, John Telfer had written to the Commissioner of Crown Lands requesting instructions as to where he should locate certain settlers.

As the Township of Sullivan was first laid out, its outlines differed in one notable respect from the plan ultimately adopted. While the eastern boundary was to be the Owen Sound Road, as it is today, and the southern boundary was drawn "parallel to the southerly outline of the Township of Sydenham"; and while the western boundary was "at right angles to the Southerly outline", the northern boundary was to be formed by "Mr. Hawkins' line", which was the line of road, projected but never opened, intended to run from Toronto to the mouth of the Saugeen River. John Dennis's plan of Sullivan, dated October 20, 1843, shows the line of the"Road to Saugeen" intersecting the Owen Sound Road about half-way between Williamsford and Chatsworth, in the middle of Lot No. 12 (counting southward from the boundary of the Townships of Derby and Sydenham), and intersecting the western boundary of Derby at a point two miles north of the present south-west angle of that township. But the so-called "Road to Saugeen" was an unfilled dream, and"Mr. Hawkins' line" did not long remain the northern boundary of Sullivan Township. In 1846, the Commissioner of Crown Lands instructed the surveyor, Charles Rankin, to complete the survey of Derby Township into 200-acre lots and, at the same time, prolong the concession lines northerly until they struck the southerly boundary line of Derby. According to the report of his survey of Sullivan, submitted by Mr. Dennis, October 20, 1843, there is a good deal of swampy land throughout the township, particularly in the north-western part. The land is good clay soil, well watered, covered with excellent timber, and there are a number of meadows supporting excellent grass.

The dates of patents for the lots in the first concession of Sullivan range from 1846 to after 1880. Each numbered lot contained 150 acres, and was divided into three "fifties"; the total number of "fifties" in the concession was 90. According to the returns submitted by John Telfer in 1842 and 1843, twenty-five of these Free-Grant, fifty-acre lots were occupied before August 31, 1843. The patents were issued only after the required settlement duty had been performed, which included the clearing of one-third of the lot. More than half of the grantees in the first concession of Sullivan had received their patents before the end of 1849. The remainder of the patents in the same concession were distributed over the ensuing fifty years.

Holland Township

Among the peculiarities of John Telfer's letters to the Commissioners of Crown Lands, there is one that requires a word of explanation at this point. As Telfer engaged in the business of meeting the incoming settlers and of assigning to them their locations on the Owen Sound Road, he marked off the road, in his mind and on his plans, into "townships". And it appears from his correspondence that what he meant by a "township" was an array of thirty 200-acre lots, fronting on both sides of the Owen Sound Road, without regard to the fact that that road would some day mark the boundary between two townships, one on each side of the road. Thus, to him, Derby and Sydenham, so far as the road was concerned, were the First Township; Sullivan and Holland, on the road, were the second; and Bentinck and Glenelg were the third. He tried to work in an orderly manner, and to fill up the lots in each of these "townships" as he went.

The concessions that fronted directly on the Owen Sound Road were laid out by John McDonald, who completed his

survey of the road in 1841. In what John Telfer called the "second township", McDonald's survey comprised Concession I of the township that later became Sullivan, and Concession I of the township that later became Holland. The lots in these two concessions were the lots that Telfer was in process of granting to his swelling tide of settlers.

According to the Historical Sketch of the County of Grey, published in Toronto in 1880, the Township of Holland was named in honour of Lord Holland, who, as Chancellor of the Duchy of Lancaster, held a post in the cabinet of Lord Grey, and later in that of Lord Melbourne. Lord Holland died in office in October, 1841.

As the demand for locations in the "second township" increased, additional concessions were ordered to be laid out in both Holland and Sullivan Townships. On September 19, 1845, the Commissioner of Crown Lands instructed Charles Rankin "to survey the 2nd & 3rd Concessions of the township of Holland and part of the 2nd & 3rd Concessions of the township of Sullivan." It will be recalled that, in 1843, "Hawkins' Line" formed the boundary between the Townships of Sullivan and Derby. In 1845, the boundary was altered to its present position, leaving a triangle of unsurveyed land in the northern part of Sullivan. In that triangle, and in the Township of Holland, Rankin was to lay out his new concessions.

In both Holland and Sullivan, the lots in the first concession contained 150 acres each, and were subdivided into three "fifties". Each "fifty" had a frontage on the road of ten chains, and a depth of fifty chains. At ten square chains to the acre, this arrangement produced a grant of 500 square chains, or 50 acres. In the southern part of Sullivan, that Dennis had surveyed, the same width was carried back through the second and third concessions. The instructions given to Rankin introduced a change. The lots in his survey were to be of 100 acres each, more or less.

The resulting lots in the Third Concession contained about 100 acres (77.83 X 12.85= 1000.1 square chains, or 100.01 acres). As a consequence of "the sinuosities of the road", the lots in the second Concession varied from 85 to 133 acres.

It will, perhaps, be of interest to note that, on the modern maps of Grey County, the lots in the 2nd and 3rd Concessions of Holland, and in the northern part of the Township of Sullivan (as far south as lot No.9, Concession I), do not correspond in width with the lots in the adjacent Concession I; while in Sullivan, from lot No. 10 southward, the lines run through from the Garafraxa Road to the back of the Third Concession. The difference reflects the operations of two different surveyors: Dennis, in Sullivan, in 1843, and Rankin, in Holland and in part of Sullivan, in 1845.

On completion of his survey, Rankin made his report to the Commissioner of Crown Lands, stating that the township is hilly, broken, stony, and there are no mill sites. He recommends granting half lots to settlers, and again warns against speculators.

The residue of the Township of Holland was surveyed in 1849. The Instructions, dated June 5, 1849, were issued to Charles Rankin, whose survey occupied the period from October 18th to December 20th, of the same year.

In the Townships of Derby, Sullivan and Holland, the dates of patent have been examined only for the first concession in each case. The following table shows that the differences in the rate of patenting were not great.

Percentage of Lots Patented	Comparative Patent Dates in Derby	Holland	Sullivan
25%	1848	1848	1848
50%	1849	1849	1849
75%	1852	1854	1856

The earliest patents for 50-acre Free-Grant lots in the first concession of Holland were issued in 1845. Of the

ninety such lots in that concession, Telfer's return of statistics, August 31, 1843, showed twenty-seven occupied at that date. The performance of the settlement duties ordinarily required from three to five years. A few, by making use of extra hands, might complete their duty in a shorter space of time. Many took longer, and some neglected their lands altogether. In the almost complete absence of records of the dates of location, it is impossible to arrive at an accurate estimate of the lag between date of location and date of patent. John McIntosh, who was settled on the third "fifty" in Lot 30, Concession I, of Sullivan, and who, by January, 1841, had partly erected his house, and was living in it, received his patent for that lot in 1848. For the adjoining "fifty", which he had apparently purchased in 1840 (for in January, 1841, he had "got 100 Akers of Land"), he obtained the patent in 1858. This single instance serves to show that the dates of patent afford no satisfactory basis for determining the dates of location, even when two contiguous lots are occupied by one owner.

Artemesia Township

Part of John Telfer's difficulty in his position as Government Land Agent at Owen Sound was the fact that he could, and did, locate settlers on Free-Grant lots faster than the surveyors could stake them out. That he was able to conduct the affairs of his office, to possess a first-hand knowledge of the tracts of land he was dispensing, and to superintend the opening of roads and the construction of bridges, with so little friction and so few complaints, speaks well for his business acumen and his honesty of purpose. The Minutes of the Executive Council, of the Province of Canada, April 1, 1844, record that he requested more land to grant. At first, he was authorized to dispose of lots on the Concessions A, B, and C, in Sydenham Township, fronting on the Bay, that is, on Owen Sound. When these also became scarce, it became necessary in 1848, to lay out new townships further inland; and one of these new townships was Artemesia.


PART OF GREY COUNTY
reduced from Rankin's map of the
Counties of Grey and Bruce-1855
From a copy of the published map by
Maclear & Co., now in possession of the
Ontario Department of Lands & Forests
Reduced scale: 200 chains (2.5 miles) = .73 inch
D.P.&D. — Conservation Branch — 1959
R.A.W.
MAP
OF THE
COUNTIES
OF
GREY AND BRUCE
CANADA
by
C. RANKIN D. S.
Scale 200 Chains per Inch
January 1855.
Maclear & Co. Lith. Toronto.
Owen's Sound
NOTTAWASAGA BAY
SYDENHAM
DERBY
ST VINCENT
SULLIVAN
HOLLAND
EUPHRASIA
COLLINGWOOD
GLENELG
BENTINCK
ARTEMESIA
OSPREY
NOTTAWASAGA
Durham Road
Toronto and Sydenham Road
Thornbury
Meaford
Sydenham
Town Plot divided into Town & Park lots
COUNTY OF SIMCOE

At the heart of the Township of Artemesia was the intersection of two important roads, the Toronto-Sydenham Road and the Durham Road.

In 1848 and 1849, Charles Rankin laid out the Toronto-Sydenham Road, passing through Artemesia from its south-east to its north-west corner. Rankin reported that "the choice part in all the Concessions of the belt of land included in this Survey is between No. 94 on the North and No. 170 on the South", adding that "the soil is equally good for a considerable distance further to the Southward, yet this is the best watered part and includes all the mill privileges or places where machinery may be established to be worked by water power"*. The "choice part" referred to is that from the vicinity of Markdale to a point two miles south-east of Flesherton.

While Rankin was surveying the Toronto-Sydenham Road, his colleague, David Gibson, was employed in laying out the Durham Road, crossing the Township of Artemesia from east to west, and intersecting the Toronto-Sydenham Road to the southward of the present village of Flesherton.

These two surveyors formed entirely different opinions of the quality of the land they surveyed, perhaps because of differences in the parts of the townships they observed. Gibson's report of June, 1849, included the following comment:

> "Artemesia so far as my Survey extends is inferior to Ospry, having considerable Swamps and low flat land until near the West side of the Township where it becomes ridgy with much Hemlock."†

Rankin's report was dated January 30, 1851:

> "Artemesia taken as a whole is a much better township than Ospry - its surface is generally rolling, the soil a good clay and gravelly loam, the timber the same as in Ospry with much less swamp, and generally there is but little waste land in it."**

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* Department of Lands and Forests, Office of Maps and Survey Records, Field Notes, Vol. 18: pages 433-435. Report, Charles Rankin, January 29, 1850, of the Toronto-Sydenham Road.

† <u>Ibid</u>., pages 292-297. Report, David Gibson, June 1849, of the Durham Road in Artemesia.

** <u>Ibid</u>., pages 430-433. Report, Charles Rankin, January 30, 1851, of survey of Osprey and Artemesia.

In his survey of the Toronto Sydenham Road, Rankin laid out 215 fifty-acre lots, of which two were patented before 1853. Within the next three years, more than 60 per cent of these lots had been patented. The rate of settlement will appear from the following table:

25 per cent patented	1854
50 per cent patented	1856
75 per cent patented	1858

Ten of these lots, apparently not desirable for settlement, remained unpatented until after 1880.

Osprey Township

Osprey Township has been mentioned in connection with Artemesia, because of the circumstance that the surveying of these two townships was ordered by the issuance of the same instructions, and because the Durham Road crossed both townships. David Gibson, who laid out the Durham Road, reported, in 1849, that the quality of the land was good but that there were extensive swamps, containing chiefly cedar, spruce and tamarack, and he notes that spruce partridge were abundant in the swamps.

To Charles Rankin, as he surveyed the township in 1851, Osprey was a mixture of good land and bad. He describes the soil as mostly limestone gravel, mixed in different parts with good clay loam, and he states that there are several beaver meadows which offered very good grass.

The Census of 1851 classified the people of Canada according to their national or racial origin. The great majority of the people thus enumerated in the townships of the North Grey Region fell into four groups: English, Scottish, Irish and Canadian. According to this classification, in 1851, the "Canadians" predominated in seven of the nine townships concerned, namely, Artemesia, Collingwood, Euphrasia, Holland, St. Vincent, Sullivan and Sydenham. In the other two townships, Derby and Osprey, people of Scottish origin made up the largest group. The proportions returned as English were small in every one of these nine townships; St. Vincent, in which the English were most

largely represented, showed 13 per cent under that head.

In the Census of 1861, the category defined as "Canadian" predominated in all nine townships, as is shown by the following table of percentages:

Artemesia	Canadians	57%
Collingwood	"	61%
Derby	"	59%
Euphrasia	"	63%
Holland	"	55%
Osprey	"	59%
St. Vincent	"	72%
Sullivan	"	52%
Sydenham	"	65%

Several changes in the system of enumeration were introduced in the Census of 1871, the first after Confederation. For most purposes, the unit of enumeration was still the township. The designation "Canadian", as applied to all persons born in Canada, was discontinued, and the persons to whom it had been formerly applied were thenceforth classified according to their remoter ancestry. In North Grey, the predominant groups became these three: English, Scottish and Irish.

The following statements briefly summarize the population data recorded in the Census returns from 1871 to 1931.

Artemesia

In this township the Irish constituted, in 1871, more than half (52 per cent) of the population; this proportion declined steadily at each ensuing census, until, in 1931, the Irish made up 36 per cent of the total. During the same period the Scots declined from 26 per cent to 21 per cent; and the English increased from an initial 18 per cent to 41 per cent.

Collingwood

In 1871 the proportions of English, Scottish and Irish were nearly equal, with a small preponderance in favour of the Irish. As in Artemesia, the relative proportions of Scots and Irish underwent a gradual decrease. The English increased from 30 to 44 per cent in the sixty years covered by these returns.

decline in the numbers of Scots to 27 per cent. From that time on the English showed an increase and became the predominant group; the Scots declined from 27 to 24 per cent, and the Irish from 38 to 34 per cent.

St. Vincent

The Scots in this township have maintained a practically constant proportion, being 18 per cent in 1871 and 19 per cent in 1931. The proportions of Irish have also remained fairly constant, at approximately twice the percentage of the Scots: generally 35 per cent, but with a small excess over that figure in 1881 (38 per cent) and in 1901 (37 per cent). The English predominated in St. Vincent, with 39 per cent of the total in 1871 and 41 per cent in 1931.

Sullivan

In Sullivan, the percentage of English declined between 1871 and 1931 from 14 to 10 per cent. The Scots declined, in the same period, from 29 to 17 per cent. In 1871, the Irish constituted 46 per cent of the total; and this fell to 37 per cent in 1901 and to 29 per cent in 1931. Beginning in 1911, and continuing to 1931, the data show a large influx of people of German origin, so much so that, for thirty years, these constitute the largest group in the township. In 1911, the Germans made up 38 per cent of the total; in 1921 44 per cent and in 1931 43 per cent.

Sydenham

The predominant group in Sydenham, throughout the period studied, was the Scottish; nevertheless, from 1871 to 1931 their percentage of the population declined from an initial 56 per cent to a final 36 per cent. During the same period the English, at first in a marked minority (15 per cent of the total), increased to 27 per cent in 1931. The Irish made up 32 per cent of the total population in 1871; their proportion remained almost constant, being 33 per cent in 1931. Thus, from an initial

Derby

In 1871 and 1881, the Irish predominated in this township. In 1901 and 1911, the numbers returned as Scottish slightly exceeded the numbers of Irish; but in 1921 and 1931 the Irish had regained their lead again by a slight margin. During the entire span of sixty years the English increased in proportion from 21 per cent to 27 per cent, but were not at any time the predominating group.

Euphrasia

There were relatively few Scots in Euphrasia at any census period, the proportions being in the neighbourhood of 10 per cent, subject to almost no change over the years. Throughout the period covered by this study, the Irish decreased from an initial 60 per cent to a final 50 per cent. In the same period the English increased from 23 to 37 per cent.

Holland

In Holland, as in Euphrasia, the Irish have been continuously the predominant group, but also subject to a steady decline in relative numbers. In 1871 they made up 67 per cent of the population; in 1931 47 per cent. The Scots were 17 per cent of the whole in 1871; and this proportion remained practically constant, being 18 per cent in 1931. The English constituted only 14 per cent of the population in 1871; by 1901 they had increased to 22 per cent, a percentage that remained unchanged during the ensuing three decades.

Osprey

The successive percentages in this township have been subject to more fluctuation than in any other township in the Region. The proportions of English, Scottish and Irish, in 1871, were 21 per cent, 33 per cent and 40 per cent. In 1881 the corresponding figures were: 26 per cent, 40 per cent and 31 per cent. In 1901 the numbers of the English had increased to 32 per cent and the Irish to 38 per cent; while the figures show a

wide disparity (English, 15 per cent; Scots, 56 per cent; Irish, 32 per cent) these three groups had, by 1931, attained much more nearly equal proportions (27 per cent, 36 per cent and 33 per cent).

The following tables present a summary of the statistics on which the foregoing discussion is based for the total of the nine townships that are, wholly or partly, situated in the North Grey Region.

POPULATION BY RACIAL GROUPS, NORTH GREY REGION

Aggregates of Nine Townships, 1871 to 1931*

Racial Group	1871	1881	1901	1911	1921	1931
English	6,817	8,685	8,348	7,337	6,656	6,311
Scottish	8,310	9,415	7,285	5,881	4,753	4,310
Irish	13,633	14,934	12,162	9,571	7,633	7,256
Unaccounted for	1,563	2,263	1,777	2,158	2,806	831
Totals	30,323	35,297	29,572	24,947	21,848	19,708

PERCENTAGES BY RACIAL GROUPS, NORTH GREY REGION

Aggregates of Nine Townships, 1871 to 1931*

Racial Group	1871 %	1881 %	1901 %	1911 %	1921 %	1931 %
English	22	25	28	29	30	33
Scottish	27	27	25	24	22	23
Irish	45	42	41	38	35	37
Unaccounted for	6	6	6	9	13	7
	100	100	100	100	100	100

* In 1891, the unit-area of enumeration was the Electoral District; data for the racial groups in the several townships are not available.

CHAPTER 3

OWEN SOUND SETTLEMENT

In 1837, the Government commissioned Charles Rankin to lay out a road from the Township of Garafraxa to Owen's Sound (the bay of that name); and Rankin had surveyed only the line for the proposed road when the rebellion of December, 1837, put a halt to the project. In 1840 the Owen Sound Road was again brought up for discussion, and, at the same time, the plan of making fifty-acre free grants to needy settlers was also taking shape. Accordingly, in June, 1840, the Lieutenant-Governor, Sir George Arthur, called on the Executive Council to consider whether it would not be a judicious course to proceed at once with the opening of the proposed road from Garafraxa to Owen's Sound, without awaiting the result of the deliberations on the subject of the proposed free grants of land, and the Council decided that the road should be proceeded with. The Commissioner, R. B. Sullivan, accordingly issued his instructions, July 6, 1840, to John McDonald, to open "the Road explored by Mr. Deputy Surveyor Rankin from the Township of Garrafraxa to Owen's Sound on Lake Huron"; and to Charles Rankin, July 8, 1840, to survey a township and a town plot, now the Township of Sydenham and the City of Owen Sound, which began as the village of Sydenham. The project as a whole constituted the Owen Sound Settlement. Many months were to elapse, and many miles of forest and swamp were to be tamed, and a number of rivers were to be bridged, before the Northern and the Southern Divisions of the Settlement were to unite into a single community, with facility of access throughout the length of the Road. At the southern end, grew up the town of Arthur, where Mr. James McNab was Government Agent in charge of Settlement, later replaced by Capt. A.M.I. Durnford.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

At the northern end, in the village of Sydenham, Mr. John Telfer was established as Agent and from his quaintly worded, and even more quaintly spelled, reports, we are able to watch the growth of "The Sound".

Mr. Telfer's first duty, even before he came to the scene of his agency, was to superintend repairs and improvements to the "Portage Road", leading from "The Narrows" (now Orillia) to Matchedash Bay, near Coldwater, a distance of about fourteen miles. This was one of the two routes between which the traveller had to choose, proceeding from Barrie to Owen's Sound, the other being that through Sunnidale Township and along the shore of Nottawasaga Bay; the Government chose to recommend and to improve the Coldwater Portage.

"The Sunnidale road is the most direct communication with Owen's Sound, but it does not terminate in a harbour in Lake Huron, and the length of land travelling is a serious objection to the choice of this route."* On the subject of the choice of roads, Mr. Telfer had a good deal to say, writing from Owen's Sound, November 15, 1840, he says that it took a Mr. Black six days to come from Barrie because of the bad state of the roads and the lack of bridges. He also says there is no road from the Township of St. Vincent and recommends that it be cut through as a sleigh road at an estimated cost of £50.

Six days later, on the 21st of November, John Telfer and three men were "imployed making shingles for the two houses and clearing away the trees that might inger the buildings." The things the Settlement was most in need of were an abundant supply of provisions, to be paid for by the

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* Ontario Provincial Archives. Crown Land Papers, Shelf 80, Box 1: Report of the Commissioner of Crown Lands, July 7, 1840.

Government, and then re-sold at reasonable prices to the settlers; "a steem boat toplay between owens sound and cold water mills"; a sailing vessel at Owen Sound, to provide for emergency and incidental travel, "as there is no boat neather than penetangashine which is about sixty miles from that place and no road to either get out or in which makes it very difficult to get along with work we could often send out the boat for things wanted which would be a great saving to the government than to hire a boat at such a distance and a great cost and much time lost"; and a doctor: "I have seen a great number of people that is wishing to go to the place but does not like to go without a Medical man being there I think as there is a great deal of work which actsidents might hapen it would be necessery to encourage a docter as for instence if a man got his arm brocken and seventy miles from assistence he might be lost."*

While John Telfer and his "hands" were making their quarters habitable for the winter, and laying their plans for promoting the progress of settlement in the coming spring, his counterpart, James McNab, at Arthur, was energetically driving "the Road" through the wilderness. Like Telfer, he was urging the Government to engage in various enterprises such as building houses and bridges and grading roads for the convenience and accommodation of the settlers.

In February, 1841, John Telfer, at Owens Sound, was "expecting a number of people in here as soon as the snow goes of to locate land". "There has been three men there for land but unfortunately the snow was so deep that all the posts is covred with snow it measures five feet and a half deep on the level on the top of the mountan it is about four feet." Telfer planned to make a trip to Toronto to get the maps he would

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* Ontario Provincial Archives. Crown Land Papers, Shelf 99: John Telfer to R. B. Sullivan: Nov. 15, 1840.

need for assigning to settlers their locations: "I will come out by the garafraxa road on snow shoes as I think it the nearest rout".

In the meantime, prospective settlers, in response to a notice*, were inquiring for land in the new settlement, and disposing their affairs with a view to embarking on the great adventure of a Free Grant in the Owen Sound wilderness.

On September 10, 1841, there was tabled in the House of Assembly of the Province of Canada a report, dated June 1, 1841, on the condition, number, and progress of the settlers on the Owen Sound Road, by Colonel William Chisholm, an engineer, the founder of Oakville. Col. Chisholm, in the interests of the entire Settlement, including Oakville, urged that the Government complete the opening of the road through to Owen Sound, and that the system of Free Grants of 50 acres be continued to actual settlers. "I found many deficient of the quantity of potatoe seed which they wished to plant, as also of provisions, and I immediately adopted measures to procure a supply to be delivered in the Settlement under the care of the Agent, for the use of the settlers."

The Report recommended the survey of a tier of lots on both sides of the road from the Township of Arthur to the Township of Sydenham and that the lots be laid out 20 chains in width.

In submitting Chisholm's report to the Legislative Assembly, the Commissioner of Crown Lands, R. B. Sullivan, took occasion to add his own observations, viz., that no settlement had taken place at the north end of the road

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* "Notice Issued by order of the Hon. R.B. Sullivan, 1st November, 1840, for the guidance of Persons Desirous of Settling at the Owen's Sound Settlement." A copy of this Notice, re-issued by John Davidson, in 1842, is reproduced in the present report.

during the previous year but that he had no doubt settlement was now in progress and hoped that the road would be connected up during the current season.

In July, 1841, Capt. A.M.I. Durnford was appointed to succeed James McNab as Government Agent at the southern end of the Owen Sound Road. Early in the spring of 1842, Capt. Durnford wrote a comprehensive report of the settlement under his charge. He expected that the Owen Sound Settlement would extend another 59 miles during the season and remarks on the rapidity of settlement, for though the southern division was nothing but a wilderness two years ago, it now has a population of about 540. He says the opening of the new road from Arthur has been of incalculable advantage, that the settlers are pleased with the land and that he has received no complaints. The greatest inconvenience on this 60-mile stretch of road is the lack of taverns, and he suggests that they be established every fifteen miles.

In the settlement the greatest lack is that of a grist mill as the nearest one is at Fergus, and he suggests that a dam could be erected across the Saugeen River at the site of the present village of Durham.

Capt. Durnford was not the only observer who felt that the lack of a grist mill was an obstacle to settlement. While the Commissioner of Crown Lands was predicting the ultimate success and prosperity of the Owen Sound Settlement as a whole, John Telfer, at the Sound, was urging the immediate building of a mill. Six weeks later, on July 27th, Telfer was able to report that 25 lots had been taken up. These were the fifty-acre Free-Grant lots, fronting on "The Road." Their occupation by actual settlers gave rise to a practice which, in time, became a source of considerable misunderstanding among the settlers and of vexation to the Government. In September, 1842, the assumption that each Free-Grant settler was entitled to regard the fifty acres adjacent to his lot as reserved for

subsequent purchase by him had become general. Fifty acres was too small a farm on which to make a living and most settlers were unable to pay for the second fifty immediately.

At the southern end of the Owen Sound Road, Capt. Durnford was making similar "reserves" for the settlers who had occupied Free-Grant lots in his part of the Settlement. On November 30, 1842, Capt. Durnford wrote to the Commissioner of Crown Lands saying that he had not told the settlers that the second 50 acres had been reserved for them, and that he was awaiting the pleasure of the Government. In the letter Capt. Durnford enclosed a petition, signed by about 140 Free-Grant settlers, which brought to a head the question of the right of the occupant of a Free-Grant lot to purchase an adjoining lot. The problem extended, of course, to the entire length of the road. The petition from the inhabitants of the Township of Arthur was at once referred to a committee of the Executive Council, whose first duty was to shatter the myth of the "reserved fifties", and their report, dated December 7, 1842, was approved in Council on December 22nd. It stated that the consent of the Government to a Free-Grant system had been obtained with difficulty. Though the opinion prevailed that the grantees would have an opportunity to purchase an additional 50 acres, this had never been the policy or intention of the Government, and the Committee recommended that the Commissioner of Crown Lands be instructed to locate or sell all the vacant lands on the road.

In spite of its tone of finality, the Committee's report was not the last word on the subject of the supposed "reserves". The settlers to whom it mattered most, those who had counted confidently on doubling the size of their farms, and those who had expended time and labour in making improvements on the "reserved" lots, were naturally most unhappy; and there were many who could show that they had received very solid assurances

to justify their confidence. Their protests and their petitions had to be considered. The Committee that had mustered its reasons for disallowing the settlers' claims met again within three months to re-consider the subject; and, in part reversed its recommendation. It stated that the object of the Government in granting 50-acre lots was to place the settlers close together, and because of the hardships which the settlers had undergone the Committee now recommended that the vacant intervening lots be reserved for a period of five years and that the settlers on adjacent lots be permitted to purchase them during that period at a price of 10 shillings per acre. The Committee further recommended that no reservation of intervening lots should be permitted in the future and that copies of the Regulations should be distributed to settlers stating that no reservation of land will be made for future purchase.

If the Order-in-Council of December 22, 1842, had made the settlers unhappy, this Order of March 7, 1843, stirred them to anger. Reluctantly, but resignedly (for the most part), they had given up their supposed claim to the adjoining lots; and the Agents, acting in good faith upon the orders received, had placed other settlers on the former "reserves". Captain Durnford had assigned nineteen such lots to new occupants; and, in all but two cases, the new occupant and the former claimant had reached some amicable arrangement for compensating the claimant who had made improvements on the lot in question. It is not clear how many such locations had been made by John Telfer, at the Sound.

The Order of March 7th upset all this, and restored to the original grantee for five years his lately lost claim to the supposed reserve. The newly located occupant, if any, must now be dispossessed of lands to which he had been lawfully assigned. Occupied lands must be left

vacant. Settlements of claims for compensation must be reversed. And, whereas, under the order of December 22nd the original grantees had felt aggrieved, under the new order both the grantee and the newcomer were made unhappy. New disputes arose. Who was to compensate the new occupant for the chopping and clearing he had done during January and February and half of March? Grantees who had entered into some kind of bargain "with persons who were at that time in the settlements waiting for grants of land which would enable them to get remuneration for the improvements upon those reserved lots", were now "vexed at the arrangement they entered into, and are trying all they can to get rid of the persons whom they recommended me to place upon their reserved lots".

With admirable restraint, Captain Durnford wrote to the Commissioner of Crown Lands: "You will perceive that the late orders in council before alluded to may perhaps lead to several references to you relating to the reserved lots which have been located."*

Everybody blamed the Government for the confusion into which the settlement was thrown. Some blamed the Agent, too, charging that he had knowingly located new settlers on the reserved lots after the date of the second order. The order was dated March 7, 1843, and reached Durnford on the 27th.

On March 25th, a number of aggrieved settlers met "at Mr. Bells Tavern in the Township of Arthur", and appointed a Committee of 12 "to Transact business in future with the Executive Council in Behalf of this Settlement, in order that our wants May Be Made Known at head Quarters and Not Concealed By Some Misrepresentation".

In time, the flurry and the acrimony of 1843 appears to have died away; the disputes were settled, and the lots were either taken up by the original claimants, or else were relinquished and re-granted to newcomers. When next the

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* Ontario Provincial Archives. Crown Land Papers: Shelf 80, Box 2: A.M.I. Durnford to A.N. Morin: March 30, 1843.

subject of land grants on the Owen Sound Road came up for discussion in the Executive Council, it was with a recommendation that the Free-Grant system be continued, and that the principle of reserving an additional fifty acres be established and confirmed. The "general opinion" that, in 1842, prevailed erroneously became in 1845, the accepted order. The plan of land granting proposed by the Commissioner of Crown Lands, and, on August 8, 1845, adopted by the Government, consisted of four principal clauses:-

> "1st THAT two in the place of one tier of lots should be laid out on each side of the Owen Sound Road, of 100 acres each, with a Road a chain wide between each two ranges. That the Ranges of Lots nearest the Owen Sound Road should be reserved for actual Settlers, granting the front 50 of each lot, the opposite Range to be disposed of by sale.
>
> "2nd THAT in addition to the usual conditions, the grantees of 50 Acres should be bound to clear the whole width of the Road in front of their respective lots, and keep it clear until the opposite lot is disposed of.
>
> "3rd THAT each Grantee pay to the Agent superintending the Settlement a fee of 5/- on being assigned his 50 Acres, and 10/-- more on receiving the certificate required for the issue of Patent. Transfers of location tickets (when approved of by the Agent) to be subject to the fee of 5/- payable by the newcomer.
>
> "4th THAT the rear 50 Acres of each lot be reserved for the grantee of the front for 9 years, being 5 years in addition to the 4 within which he is bound to complete the requisite Settling duties, with the privilege of buying during the first three years at 8/-, during the second three years at 9/-, and during the last three years at 10/-.

From the beginnings of his settlement, in 1841, John Telfer had repeatedly urged upon the Government three things essential to its success: a passable road to Arthur, a grist mill, and a supply of provisions. At the end of the first summer, Telfer began to be concerned for the very existence of his small but growing community, and to ask for authority, and cash, for purchasing supplies of food.

In Telfer's mind, as in the minds of many others, the completion of the road was a matter of increasing importance not so much as a means of affording the settlers lots to be located, but rather as a means of communication between Owen Sound and the outside world. Col. Chisholm, who was employed as an engineer to supervise the building of bridges along the Owen Sound Road, shared Telfer's opinion.

The progress made in opening the road was necessarily slow; but, with allowancesfor the difficulties that had to be overcome, progress was satisfactory. On November 6, 1841, Capt. Durnford, the Government Agent at Arthur, found "the Road was opened and passable for a waggon or Sleigh ... up to the 29th Mile" in the vicinty of Durham, counting miles from the Owen Sound end; "and it was expected that the Advanced Party would cut to the 2nd Saugine River that night which would leave about 5 miles more to be cut upon my side. And I understand about 5 miles on Mr. Telfers end of the Road.*

During the latter half of November, 1841, the Rev. Arthur Palmer, Rector of Guelph, travelled by the Owen Sound Road as far as the site of the town of Durham, and in his report to his Bishop, supplied many interesting details.

He describes Elora, founded 8 or 9 years before, as prettily situated on the Grand River, with good mill facilities. Arthur contained only a log tavern, an unfinished log house, two small shanties and a sawmill. In the evening he arrived at a shanty (the site of the future village of Mt. Forest), the walls of which were only three logs high. It consisted of one room, with the fire in the middle, and he spent the night here with eight other people.

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* Ontario Provincial Archives. Crown Land Papers: Shelf 80, Box 1: A.M.I. Durnford to John Davidson: Nov. 9, 1841. The "2nd Saugine", the second branch of that river, counting from the north, and not counting the North Branch, at Williamsford, which was not recognized as "a Saugine", is identified as the Main Saugeen River, which crosses the Garafraxa Road at Durham.

On December 21, 1841, Mr. Telfer wrote: "the road is finished with the exception of two Bridges not finished on account of the stormey wether if the wether is favourable the incoming week I will have it finished ... there is not any travel across to Arther at this season."*

Later reports indicate that there were further delays, and that winter conditions were not conducive to rapid progress. Writing from Arthur, on January 12, 1842, Durnford addressed the Commissioner of Crown Lands as follows.

> "I have the honor to report the completion (on the 31st of Dec'r) of the New line of Road to Owen's Sound from the 25th mile to the Maitland River † by which means a Winter communication is opened from the 25th mile to the Village of Arthur, a distance of 35 miles. And I am also informed by passengers from Owens Sound that Mr. Telfers end is also very nearly completed, having only a few Rods of covering to put upon some Bridges which would have been finished had it not been for some unforseen difficulties with regard to ox teams . . . . .
> I beg leave to remark also that although the Road may be considered a passable Winter communication there are swamps which in the spring of the year will require causewaying . . . " **

It was apparent, before the winter was out, that it was one thing to "open" the road, and quite a different thing to travel it. Writing on February 7, 1842, John Telfer described some of the difficulties caused by deep snow and says that when the thaw comes it will be impossible to cross the cedar swamp near Dornock.

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* Ontario Provincial Archives. Crown Land Papers: Shelf 99, John Telfer to John Davidson: Dec. 21, 1841.

† The "25th mile" was about one mile north of the Rocky Saugeen. The "Maitland River" was the South Saugeen, at the present town of Mount Forest; John McDonald in 1840, erroneously identified this river as a branch of the Maitland, and the error persisted until about 1865.

** Ontario Provincial Archives. Crown Land Papers: Shelf 80, Box 1: A.M.I. Durnford to John Davidson: Jan. 12, 1842.

At the end of March, 1842, Capt. Durnford was called on to submit a report dealing with all aspects of the Settlement; the concluding paragraph of his report refers to the progress of work on the road. He says the road is passable for sleighs and wagons in dry weather but he is unable to estimate the cost of making it a good dry wagon road because of the depth of snow at the present time.

Settlers on their way to the northern end of the Owen Sound Settlement, for the most part, arrived either by boat from Coldwater or by way of the Sunnidale Road and the Township of St. Vincent. Available lots in Sydenham Township were taken up about as fast as they could be surveyed. Mr. Telfer found it necessary to devote an entire letter to the problems of location and settlement. He states that the Free-Grant lands are all taken up except for a few that are not fit for farming. There are many seeking land who are disappointed to find that there are no more free grants and he expects that the survey of Sydenham Township will be finished by July 11, 1842.

In the winter of 1842-43, more than a year after the road had first been "opened" through, Telfer again turned to the question of making it "passible for Sleighs", and estimates it would cost about £40.

In August, 1843, it was reported in the village of Fergus "that Gov't proposed without delay to open up and make the road from Arthur Village to Owens Sound, fit & sufficient for transport & travel."* The report was premature. In a report submitted to the Legislature by the newly constituted Board of Works, February 5, 1845, the grounds were stated "on which the favourable consideration of the Executive is claimed for the construction of this Road" -

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* Ontario Provincial Archives. Crown Land Papers: Shelf 80, Box 2: Adam Ferguson to A. N. Morin: Aug. 26, 1843.

"First - That it would form short and direct communication between the two lakes, and would pass through a large section of the Province, not enjoying the benefit of water communications, which most of the other parts of the country possess.
"Secondly- That no other line in the Province traverses a greater extent of available and fertile Crown Land (stated to be five millions of acres) than it does, the settlement of which has been hitherto prevented by the all but impossibility of getting into or out of it.
"Thirdly" - That a number of industrious and enterprising persons have, within the last two or three years, settled on this tract, on the faith of the promise of Government to open this Road, which promise was held out to them and expressed in the printed notice and regulations issued from the Crown Land Office in 1840, under which the settlement was originated."

The report proceeded to discuss the state of the road, from Dundas, through Guelph, to Arthur, and thence to Owen Sound. The following description refers to the northern part of the road, beginning at Arthur.

Through the Townships of Arthur and Egremont (about 18 miles) the road has been partly opened by the Government but is in a very bad state. Through the remainder of Egremont, Glenelg and most of Holland Townships, (about 29 miles) it is unopened. The remainder of the line to Owen Sound (about 13 miles) crosses the excellent land of the Townships of Holland, Sullivan, Derby and Sydenham. The Board of Works estimates that it would cost £3,500 to clear and construct a road through the unopened sections.

More than a year passed before the Government could report any satisfactory progress on the Owen Sound Road. The great length of the proposed road involved "great inconvenience of furnishing supplies, provisions, and fodder", and those contractors who submitted tenders demanded "rates nearly double the value of the work to be executed". The report of the Board of Works, presented to the Legislature in April, 1846, ended with these words: "There is now, however,

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* Ontario Provincial Archives. Crown Land Papers: Shelf 80, Box 2: Adam Ferguson to A. N. Morin: Aug. 26, 1843.

every prospect of the Works being carried on in a satisfactory manner." The Legislature appropriated £4,000 to be expended on the road.

Still another year passed, and the Board of Works was superseded by the Commissioners of Public Works with Casimir Stanislas Gzowski as their Engineer. The Owen Sound Road was by this time referred to as the Dundas and Owen Sound Road; and Gzowski discovered to his embarressment that "as the money was granted for the opening of the entire road, it could not be spent in improving any particular portions of it, but must be applied towards opening of the line throughout." This led to increased costs and he asked for a further grant of £1,500 to make the road passable for Wagons. In addition he requested £9,550 to make the road from Fergus and Owen Sound a good turnpike road.

In passing the Engineer's report to the Legislative Assembly, the Commissioners added their own comment.

> "This road has been left in a very bad state. The swamps are not drained, nor bridges built; the Engineer explains in his Report, the cause, why the Grant did not accomplish what was expected. If the whole amount recommended to complete it, cannot be obtained, the Commissioners recommend, that the smaller sum of £1,500, should, at least, be placed at their disposal, to make the road passable.
>
> "This is an important road, leading to a section of the country thinly settled, but where there is much vacant land belonging to the Government and individuals, which would be taken up by Emigrants, if access by this road were given them."*

The making of the road to Owen Sound was thus a slow and gradual process, a long-drawn struggle to overcome intolerable conditions with insufficient funds. "The work was let to Mr. James Watson, on the 11th December, 1847, and will be completed by the 1st July, 1848. The worst portions of the road between Fergus and Owen's Sound, will be made passable for wagons at all seasons of the year.

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* Journal of the Legislative Assembly, Province of Canada, 1847.

Woodford, in Sydenham Township. The brick hotel to the right, where the old road joins the present highway, was a coaching stop halfway between Meaford and Owen Sound.

Flesherton in 1957. The present hotel on the right replaced the original hotel, but seems to be one of the oldest buildings in the village.

Meaford, 1957. Buildings on the main street date from the second half of the last century. The hotel on the right is perhaps the oldest.

CHAPTER 4

ROADS

1. Roads via Barrie

The opening of the Townships of Collingwood and St. Vincent, in 1833, created at once in the minds of prospective settlers the problem of how to get there. Since there were no roads, the only access must be by water. "The easiest access to these townships", wrote Charles Rankin, "will be by Lake Simcoe to the Narrows, thence 14 Miles by land, to Cold-Water, where in the course of the approaching summer there will be a steamboat (now building at Penetanguishene) in readiness to convey settlers to any part of the coast now surveyed".

But the Orillia-to-Coldwater portage was not the only route to the new settlements. Even while Rankin was busy with his survey of Collingwood and St. Vincent, another surveyor, William Hawkins, was employed in laying out and opening the Sunnidale Road, leading west from Barrie into the Township of Sunnidale, and through Sunnidale northward to the shores of Nottawasaga Bay, the survey of which was completed in 1833 from Kempenfeldt Bay to Sunnidale Township.

Settlers bound for St. Vincent now had their choice of two routes for the part of their journey that lay between Lake Simcoe and Georgian Bay. It was a choice between two evils; both roads were all but impassable, and those settlers who undertook the journey, some via the Orillia-Coldwater portage, some via Sunnidale, when they met at their journey's end, found that they all shared, at least a common interest in the hazards of the execrable roads.

During 1834, a considerable number of settlers succeeded in reaching Collingwood and St. Vincent Townships. With their own travels still fresh in their minds, they urged upon the Government the increasing necessity for a better road between their settlement and the rest of the province than those by which they themselves had travelled. Early in 1835, Charles Rankin, having occasion to visit Toronto, brought to the attention of the Commissioner of Crown

Lands the need for roads in the townships in which he was specially interested.

After outlining the course of his proposed road along the northern fronts of the townships between Sunnidale and St. Vincent, following the shore of Nottawasaga Bay, Rankin recommended that it be 2 rods in width and that streams be forded rather than bridged in order to save expense. These proposals were approved, and the work was placed "under the controul of Dep'ty Surveyor Rankin, and allowing him to employ the Emigrants who are now in the adjoining townships at moderate wages."

"Rankin's Road" was accordingly opened in the course of the ensuing summer. At the end of the first week of June, 1835, Rankin wrote a progress report which stated that he was constructing the road near the lakeshore, taking advantage of every strip of beach, and though cedar and balsam thickets made some sections costly, he hoped to save enough money by making the road narrow to build a bridge over the Beaver River.

Writing again on the 3rd of August, 1835, Rankin stated that the road was "now nearly compleated", and asked for the sum of £250 to cover the expense. For the next five years, however good or bad the roads may have been, most of the settlers whose lands lay in Collingwood and St. Vincent Townships, travelled by one or the other of these two routes - either by the Coldwater Portage or by the Sunnidale and Rankin roads. It was natural that there would be petitions addressed to the Government for the improvement of both routes, some petitioners urging the one, and some the other.

In 1840, the Commissioner of Crown Lands ordered an examination to be made of both roads, selecting the one he thought the better suited to his purpose, and recommending the outlay of funds for its improvement. The person chosen to make this examination was Henry John Jones, one of the Clerks in the Surveyor-General's Office, who later became Surveyor-General. Jones submitted his long and detailed report, June 25, 1840. The Commissioner, in his report to the Lieutenant-Governor, took account of all

that Mr. Jones had said about each of the two routes, and decided in favour of the Coldwater Portage.

In his report of the Sunnidale Road, in 1840, Henry John Jones referred to the road that led westward into Nottawasaga Township on the line between the 10th and 11th concessions of Sunnidale, a road that the inhabitants described to him as being "in a dreadful state." The dreadful road, however, led in the direction in which the settlers wanted to travel, and in time it became an important artery, at first to Nottawasaga Township and the port of Collingwood, and later, to Meaford and Owen Sound. Its extension through the Townships of Osprey, Collingwood, Euphrasia, and St. Vincent, came to be known as the Old Mail Road, or the Mountain Road. On Charles Rankin's map of Grey and Bruce Counties, published in 1855, it is simply marked, "Road".

The Mountain Road was established by a by-law of the Simcoe District Municipal Council, passed May 14, 1846, at a time when these four townships were comprised in that District.

It is possible that the Mountain Road had been a travelled way before its formal establishment as a public road. The passage of the by-law gave it official recognition, and made it lawful to apply statute labour to its improvement. For many years it served as an important road of access to the settlements in St. Vincent and Sydenham. On the other hand, the Mountain Road did not wholly replace the road that Rankin, in 1835, had opened along the shore.

It is recorded that, on one occasion, in 1852, "the Council" (which may have been the County Council of the newly constituted County of Grey) forbade the inhabitants along Rankin's Road to put their statute labour on that road, requiring that it be applied to the Mountain Road, "on the plea that Rankin's Road is not an established line", though William Gibbard, the Commissioner of Crown Lands, stated that in his opinion it was an established line as Government money had been expended on it.

Accounts differ as to the amount of traffic that passed

over the Mountain Road. The Historical Sketch of the County of Grey (1880) implied that it was insignificant: "a great share of the 'traffic' of this locality (if we can apply the term to the very limited amount of intercourse then existing with the outside world) turned in the direction of Barrie." Marsh's History of the County of Grey (1931) says that it was the route by which the earliest settlers coming overland reached Grey County.

After its official establishment by the District Council, the Mountain Road was entitled to be maintained by statute labour, and was referred to as the Government Road, or the Mail Road. However, it seems never to have been well maintained, and, at times, was almost impassable. In spite of neglect, and of the numerous complaints to which it gave rise, it remained an official road until the construction of the railway to Collingwood, in 1854, removed the last vestiges of justification for its maintenance. An examination of the modern map of Grey County shows part of the Mountain Road still in use running westerly and northwesterly from Heathcote, through the 1st, 2nd, and 3rd Concessions of Euphrasia, and across the 4th Concession of St. Vincent, it then joins the road between the 4th and 5th Concessions, and continues northward into Meaford.

2. Toronto-Sydenham Road

This road, sometimes called the Toronto Line or the Toronto and Owen Sound Road, was intended to provide direct communication between Sydenham (Owen Sound) and the provincial capital.

The Commissioner of Crown Lands, James H. Price, issued his instructions, June 9, 1848, to Charles Rankin, to perform the survey.

The indicated point of commencement was on the boundary line between the Townships of Amaranth and Melancthon, about two miles west of the present village of Shelburne. Here Rankin encountered an impassable swamp, which he avoided by a detour of a mile and three-quarters northward, to Lot No. 5, in the 4th

Concession of Melancthon, before taking a north-west course toward the Township of Holland.

Rankin's survey occupied him from June 21 to October 9, 1848. He reported that he was very favourably impressed with the country through which he had passed; he considered it suitable both for farming and for road-making, except in the Township of Melancthon where he had to cross a good deal of swamp.

The cutting out and the necessary causewaying followed closely on the surveying of the line. "As the Government are now getting it cut out, and it is likely to be settled from one end to the other next Summer, it will doubtless soon become an important public thoroughfare." Four years later, in 1852, Rankin estimated that 37½ miles of the road had been opened, and that the sum of £3,000 would be required to make the entire road passable for wagons.

Settlement along the Toronto-Sydenham Road was to follow the pattern of settlement along the Garafraxa Road, that is, settlers were to receive a free grant of fifty acres provided 12 acres were cleared within 4 years.

The Agent appointed to superintend the settlement was Mr. George Snider, who later became sheriff of Grey County. He established the "Government House" on Lot No. 199, on the west, or south-west, side of the road, about four miles from Dundalk. There he must have done a thriving business, for his Statistical Return, made in 1851, accounted for no less than 2,024 persons settled on lots within his jurisdiction.*

With that Return, Mr. Snider's statistics ceased. The Toronto-Sydenham Road was not included among the roads reported upon by the provincial Commissioners of Public Works. It appears to have passed under the jurisdiction of the counties through which it passed, and to have remained in the classification of county roads until it once again became a provincial highway, known as Highway No. 10.

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* Ontario Provincial Archives. Crown Land Papers: Shelf 81, Box 2. Statistical Returns, by George Snider. Endorsed "/51", presumed to mean: 1851.

CHAPTER 5

RAILWAYS

The opening of the Owen Sound region to settlement coincided with the development of a number of ambitious railway projects in Upper Canada. One of these was the Toronto and Lake Huron Rail Road, chartered on April 20, 1836, and empowered to construct a line of railway "commencing at the City of Toronto and extending to some portion of the navigable waters of Lake Huron."

In spite of the enthusiasm, this project failed to reach the stage of actual construction. In 1845, the Act of incorporation was amended to enable the Company to extend its construction into the newly-formed Simcoe District; and still the work was not commenced.

In 1849, a further Act was passed by which a company was incorporated that superseded the Toronto and Lake Huron. This Act was entitled "12 Vict., Cap.196: An Act to incorporate The Toronto, Simcoe, and Lake Huron Union Rail-Road Company," assented to, July 30, 1849, and promulgated by proclamation, Aug. 29, 1849.

After several changes of name, the proposed line of railway became the Northern Railway of Canada, with its terminus at Collingwood. In 1871, the North Grey Railway Company was incorporated, and authorized to construct a line of railway from Collingwood "to the village of Meaford, in the County of Grey, with power to extend the same to the Town of Owen Sound". And in 1872, several such piece-meal companies were amalgamated under the name of the Northern Extension Railways Company.

It was the Toronto, Simcoe and Lake Huron Rail-Road Company that the people of Owen Sound, in 1850, had invited to build a line of railway to serve their needs, paralleling as they conceived the project, the newly-opened Toronto-Sydenham Road, and with their fine harbour as its northern terminus. The Toronto Globe, of August 31, 1850, contained an account of "a general meeting of the inhabitants of the Townships of Sydenham, Derby, Sullivan, and adjoining country, held at Coleman's Inn in the Town of Sydenham,

Owen Sound, on the 24th day of August, 1850", specially called for the purpose of convincing the Directors of the new railway of the advantages of Owen Sound and of the route they had selected, "the new Toronto Road, as being the best route and terminus for a Railroad to connect the waters of Lakes Ontario and Huron."

In the course of the meeting, no less than twelve elaborate resolutions were adopted, recommending the superiority of Owen Sound Harbour over those of Penetanguishene or the Nottawasaga River; and the commercial superiority of the Town of Sydenham, "possessing already a population of over 500 persons", and offering "the best position for a Rail or Plank Road Terminus, far superior to either Nottawasaga River or Penetanguishene, which possess nothing in themselves and are surrounded with extensive tracts of poor, sandy land not fit for settling on." Added to these uncomplimentary comparisons was a resolution by which the meeting refused to grant financial assistance to the proposed railway, at the same time urging "more permanent advantage" in other ways.

But the arguments and the persuasions of the inhabitants of the Owen Sound Tract failed to prove the inducement they were designed to be; they sounded more like a rebuff than a challenge. The railway was eventually built, not to Owen Sound (Sydenham) but to Collingwood, whence it was later extended to Meaford. The ambitious Town of Sydenham was left, with its excellent harbour, with its extensive tract of the best land in the Province, with its teeming fisheries, and with no railway, until after the lapse of more than twenty years.

The Northern Railway, including its extension to Meaford, was, in 1888, amalgamated with the Grand Trunk Railway, and subsequently became part of the Canadian National Railways.

The first railway venture that succeeded in reaching Owen Sound was the Toronto, Grey and Bruce Railway. In 1868, the Legislature of the newly-formed Province of Ontario passed an Act, assented to March 4th, 1868, to incorporate the Toronto, Grey and Bruce Railway Company. The Act authorized the "construction of a

Railway from the City of Toronto to the Village of Orangeville, or some point in the vicinity therof, and thence to Mount Forest or Durham or some point in the vicinity of either, and thence to the border of the County of Bruce, and to Southampton, in the County of Bruce, on Lake Huron, with a branch to Kincardine, in the County of Bruce, on Lake Huron, and also from some point in the line above-mentioned, at or east of Mount Forest or Durham, to the Town of Owen Sound."

Five years and three months later, on Thursday, June 12th, 1873, with the road-bed not quite finished, and the last mile of rails not yet laid, the first passenger train over the Toronto, Grey and Bruce Railway, from Toronto to Owen Sound, left Union Station a few minutes before eight o'clock, and took just over twelve hours to reach its destination. The passengers were about a dozen officials of the Company, a few civic officials, and two representatives of the press.

The Toronto, Grey and Bruce Railway was, at first, a narrow-gauge road. The experience of the first ten years of its operation showed that the narrow gauge was not satisfactory, and that the necessity of re-loading goods from cars of one gauge to those of another was a great inconvenience and expense. In the early 'eighties, the tracks were widened to standard gauge.

In 1882, the Toronto, Grey and Bruce was, for a term of less than two years, leased to the Grand Trunk Railway. Then, for one year, it was operated by the Ontario and Quebec Railway; and, in 1884, it was leased to the Canadian Pacific for a term of eighty-nine years. In 1857, an Act was passed by the Legislative Assembly of the Province of Canada, to incorporate the Toronto and Owen Sound Railway, "from the City of Toronto to the Town of Owen Sound, and thence to Lake Huron". This was to have been a branch of the Grand Trunk Railway, to unite with the main line of that road "at any point not further west than Brampton". Before this proposed railway reached the construction stage, it was superseded by the Wellington, Grey and Bruce Railway, incorporated in 1864, and authorized to

construct a line from Guelph to Southampton with a branch line to Owen Sound.

Through a number of changes of name that are difficult to follow, the proposals contained in the successive Acts of incorporation were finally realized when, in 1894, the Owen Sound Branch of the Georgian Bay and Lake Erie Division of the Grand Trunk Railway was opened to traffic. This is now (1959) the Owen Sound Branch of the Canadian National Railways, which joins the Wiarton Branch at Parkhead.

Grey County Building, Owen Sound. The original Court House of 1853 included the lower part of the tower and the part to the left of it.

Presbyterian Church at Leith, built after 1860, though the appearance of this well-proportioned building suggests an earlier date.

Town Hall and Fire Hall at Meaford. These buildings represent civic enterprise of two epochs, about 50 years apart.

CHAPTER 6

OWEN SOUND AND MEAFORD

1. Owen Sound

The instructions given by the Surveyor-General to Charles Rankin, in 1837, for the laying out of the "Road from Oakville to Owen Sound", included a direction for pointing out a suitable location for a town plot at the northern end of the road.

At the conclusion of his survey, Rankin gave a brief account of the site he had selected, saying there is a perpendicular rock descent into the valley of the Big Bay River, whence the land slopes gradually to the water's edge.

For the ensuing three years, "the valley of Big Bay river" remained undisturbed between its perpendicular rock cliffs, while the people of Upper Canada turned their attention to more urgent matters. In 1840, the Government once again ordered the opening of the road, entrusting that service to John McDonald, and, at the same time, called on Charles Rankin to make a preliminary examination of the site for a town and report on the various advantages and facilities.

In order to promote the orderly settlement of the lots that were being laid out on both sides of the Owen Sound Road, it was considered necessary to place a Government Agent at each end of the road; and it was natural to suppose that, about each such Agency, a town would grow. At the southern end of the road there grew up the village of Arthur; at the northern end, the village of Sydenham which had been surveyed by Rankin.

Accompanying Rankin's report of his survey was a plan of the Town Reserve he had marked out. Rankin suggested the laying out of a part of the Reserve into town lots, the proposed town to lie on both sides of the Sydenham River, and at a distance of about three-quarters of a mile from the waters

[illegible]

[illegible] sounds [illegible]

[illegible] curve [illegible] marked out. [illegible]

of the Sound. The choice of this site involved Rankin in subsequent controversy; in order to avoid the swamps that bordered the river at its mouth, he had placed the town at an inconvenient distance from the deep water of the Sound, and it later became apparent that the river would not serve the purposes of navigation. Rankin's report, dated October 8, 1840, requested permission to continue the survey and was referred to the Lieutenant-Governor for his approval. With the Governor's approval, Rankin was accordingly instructed to proceed with the survey.

Before the first winter closed in the newly appointed Agent, John Telfer, had arrived, and had begun the erection of the buildings he would require for the performance of his duties. A few settlers had also found their way to this remote piece of wilderness, to view the location and then to withdraw to more comfortable accommodation until another year. On the fifteenth of November, Telfer wrote to the Commissioner of Crown Lands, telling him there was no use sending any more people that winter. In another letter written six days later, Telfer gave particulars of his new buildings, one of which it was possible to live in. These were the first in the town that has since become the city of Owen Sound. Telfer's letter of November 21st states that the town will require steamboat connections with Coldwater and Penetanguishene.

Through the ensuing winter, Telfer kept three men at work splitting out shingles, and at various other jobs, for his unfinished houses. The little village, consisting at first of one house, and a little later of three, was sometimes referred to as the settlement upon Owen's Sound, and sometimes simply as the northern end of the Road. Toward the end of the winter, Telfer

wrote again to the Commissioner, saying three men had come to look at land but the boundary posts were buried under 5½ feet of snow on the level.

The settlement at the head of Owen's Sound was now, in terms of postal services, the remotest place in the province. From the occasional references which John Telfer made to the exchange of communications between himself and the Government offices at Toronto, it appears that it was not unusual for a letter from the one to take from three weeks to a month to reach the other; and Telfer's letter, written in February, was the latest that the Commissioner of Crown Lands, in Toronto, had received when in June he prepared a report on the progress of the Owen Sound Settlement, which, in turn, was laid before the Legislative Assembly, on September 10th. According to the letters that have been preserved, there were other letters written which went astray and were lost. To those who succeeded in making their way to those far-off shores, Owen's Sound may well have seemed to be the remotest place in the world. One of Telfer's letters, written April 20, 1842, a year and a half after his first arrival in Owen's Sound, gave an account of the difficulties attending the correspondence between himself and "the office". Many of his letters apparently went astray. He complains that he did not receive some of them because they were addressed to Sydenham Post Office and points out that there is no such place as Sydenham Post Office, the nearest being St. Vincent 26 miles away.

In his report to the Governor-General, dated June 9, 1841, Mr. Sullivan, the Commissioner of Crown Lands, recommended the sale of town lots to the settlers at Owen's Sound at a price of £5 and that other lands should be sold at 8s. per acre.

In November, 1841, the Reverend Arthur Palmer, then Rector of Guelph, visited the settlers scattered along the southern half of the length of the Owen Sound Road. On Tuesday, November 23rd, he arrived at the "Saugine river", at the site of the present town of Durham; and the reports that reached him there that there

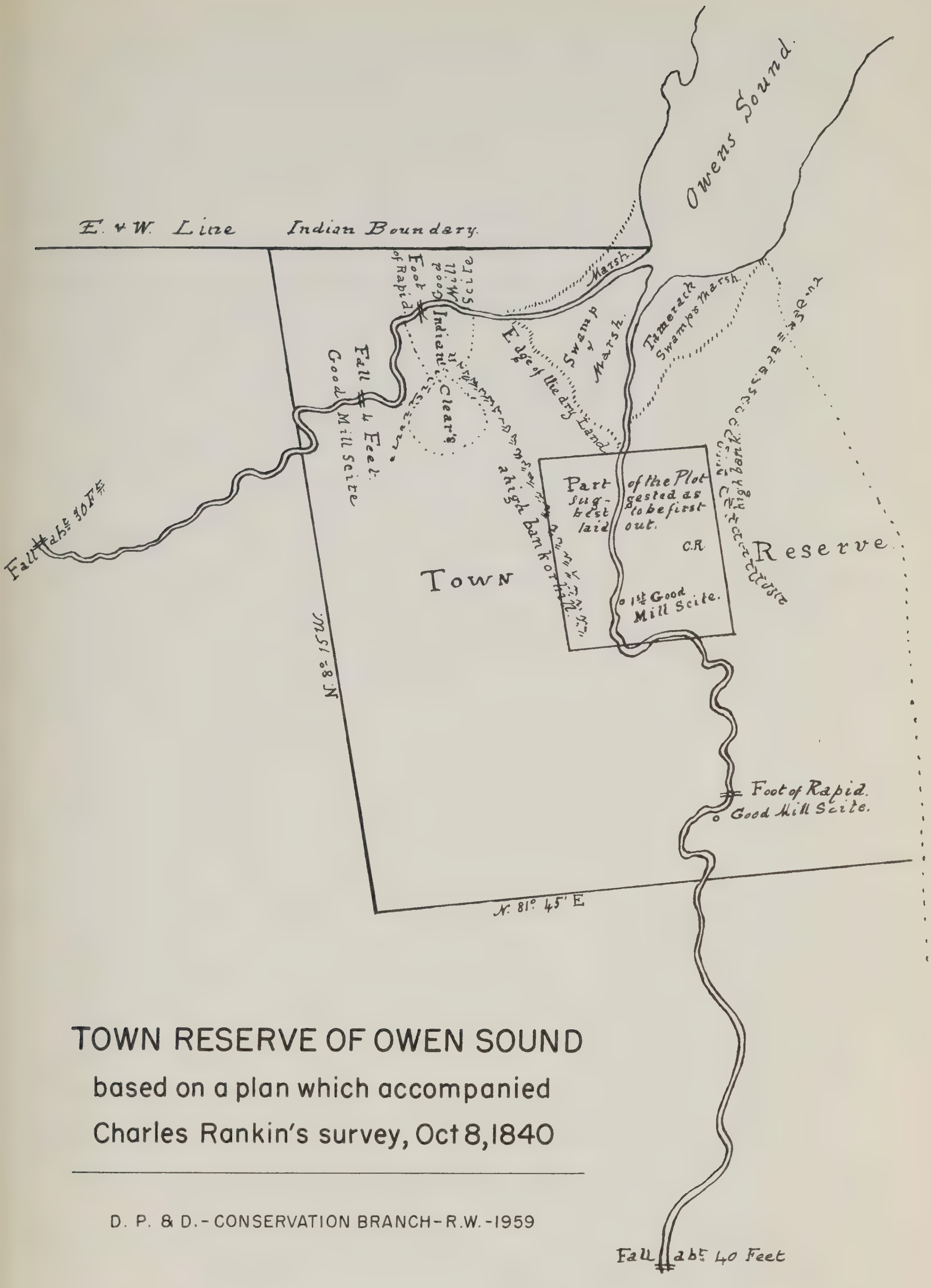
were no settlers for the next 35 miles beyond that point, induced him to turn back. He did say, however, that he later heard there were 24 families at the Sound.

If John Telfer wrote few reports during the year 1841, one of the reasons may have been that he had his hands full with receiving, disposing, and locating the settlers who had begun to arrive. He had completed the building of the three Government houses, in one of which he and his family lived. The other two, connected by a 10-foot "breeze-way", were in use, one as a storehouse, the other for the accommodation of the newcomers.

Early in the summer of 1842, an event took place on the shores of "Owen's Sound", which proved, in fact, to be of minor significance, but which deserves to be noticed because of the effect it might have had upon the course of settlement in that remote region. The Honourable Alexander Fraser, of Fraserfield, in the County of Glengarry, Member for that county in the Legislative Assembly, entered into an "arrangement" with the Honourable R. B. Sullivan, then a member of the Executive Council, and Mr. John Davidson, Commissioner of Crown Lands, to pay a visit to the Owen Sound Settlement, "in order to ascertain, and be enabled to report upon, the Capabilities of that part of the province, with a view to its immediate settlement." Upon Mr. Fraser's return from that visit, he submitted an account of his findings to the Governor-General, Sir Charles Bagot, together with his proposals for remedying what he considered to be the defects in the plan of settlement. He criticized the location of the town as being too far from the lake and on the side where the water is shallow. Continuing his report, Mr. Fraser presented the following criticisms and proposals.

1. That the town reserve, of three square miles, was too large,

2. That the whole of that reserve should be disposed of to actual settlers, leaving the laying out of towns and villages to the enterprise of individuals.



TOWN RESERVE OF OWEN SOUND

based on a plan which accompanied

Charles Rankin's survey, Oct 8, 1840

D. P. & D. - CONSERVATION BRANCH - R.W. - 1959

40. Chains to an Inch

3. That he, Alexander Fraser, would be willing, if suitably remunerated, to superintend the establishment of this new and promising settlement.

4. That he acquire by purchase or location a grant of the east half of the present reserve, on which he would immediately lay out a town and erect a pier or wharf. The exclusive right of laying out the town and streets being left to him.

5. That he be appointed Government Agent there, with full powers to dispose of lands and remittance of purchase money.

6. That further surveys be immediately undertaken.

7. That the Sunnidale Road be repaired, at a cost of at least £200.*

To such an extent were these proposals dealt with confidentially that no reference to them appears in the official Minutes of the Executive Council: and only one other document has been found that refers to them. An extract from Mr. Fraser's letter was sent to Mr. Rankin, who, in his reply defended his choice of a town site.

While it does not appear that any of the Honourable Mr. Fraser's proposals were adopted, it is probable that his criticisms had some effect upon the development of the town site and the harbour. Several months after he had submitted his report to the Governor-General, Mr. Fraser petitioned the Government "on the subject of certain Lands which he purchased at Public Sale in 1839 in the Ottawa District", and it was recommended "that Colonel Fraser do receive 2000 Acres of land in the Township of Sydenham as an equivalent for the land sold to him, a large portion of which had been previously disposed of under the 28th Section of the Act for the disposal of Public lands."

The records of the Patent Office show that the Honourable Alexander Fraser, of Fraserfield, was granted 2,025 acres, all of which was within five miles of Johnson Harbour, the

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* Ontario Provincial Archives. Crown Land Papers: Shelf 80, Box 1. Alexander Fraser to Sir Charles Bagot: June 21, 1842.

date of Patent being July 14, 1843. At a later date, he bought an additional 426 acres of Crown lands, in the same vicinity. It is not clear what his motives were in making these purchases. He continued to reside on his 1,600-acre farm, Fraserfield, at McGillivray's Bridge in Charlottenburgh Township, serving from 1842 to 1849 as Warden of the United Counties of Stormont, Dundas and Glengarry, and as Registrar for the County of Glengarry from 1841 until his death in 1853.

While the Government was considering, and apparently rejecting, Colonel Fraser's proposals, Mr. Telfer continued to wrestle with the immediate problems of accommodating, locating, and provisioning the incoming tide of settlers; and of these there were some whose intention was to take up residence in the infant community of Sydenham Village.

Among the Crown Land Papers to be found in the Ontario Provincial Archives, there is an undated document bearing the title: "Statestical Return of the Settlement at Owens Sound Northren Devision". It is also without a signature; but it is readily identified as the work of the Government Agent, Mr. John Telfer, whose handwriting and unconventional spelling are not difficult to recognize. A comparison with a similar Return, which is signed by John Telfer, and dated August 31, 1843, indicates that the undated Return was compiled in 1842, probably after July 11. From it the following information is taken, showing the numbers of people and houses in the village of Sydenham. The spelling is that of the original.

	Fraim houses		Squared timber		Total in Family
	1 story	2 stories	1 story	2 stories	
John Telfer					11
Government			3		
Hugh G. Cample			1		4
William C. Boyde		1			13
Robert Elliot				1	4
John P. Mason					5
		1	4	1	37*

According to the return made at the end of August, 1843, the number of houses had increased, but there were fewer people.

Lots ocopied in the Villige of Sydenham		Fraim Houses	Hewen Log Houses	Total in Family
Government Houses,	John Telfer		3	7
George J. Gale	Merchant Shop	1		4
Heugh G. Cample	Tavren		1	3
Esra Brown	Tanners Shop		1	2
Thomas Rutherford	Tavren		1	2
Thomas Hinchclif	Merch't Shop		1	2
William C. Boyde	Merch't Shop	1		10
Thomas Cavres	Carp'r Shop	1		1
John P. Masson		1		1
		4	7	32†

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* Ontario Provincial Archives. Crown Land Papers: Shelf 80, Box 2. Statestical Return of the Settlement at Owens Sound Northren Devision. (Undated, presumed: 1842)

† Ibid. Statestical account of the Northeren devision Owen's Sound Settlement. John Telfer to the Commissioner of Crown Lands: August 31, 1843.

According to the next population return of Sydenham Village, made in December, 1844, the resident population had by that year increased to 53. The return deals with the people only, and omits particulars of their houses.

Name of person in possession of lot	Religion	Total number in family
Thomas Rutherford	Church of Scotland	2
Thomas Cavers	Church of Scotland	1
E. S. Lyman	-	1
William C. Boyd	Baptist	8
Alexander Stephens	Baptist	2
William Bane	Church of Scotland	4
John Bell	Baptist	3
John P. Mason	-	1
James Dease	Church of England	3
George Gale	Church of England	3
Thos. Hinchcliff	Church of England	2
William Cample	Church of Scotland	1
George Brown	Church of Scotland	5
John Telfer	Presbyterian Dissenter	9
Archibald McMurchy	Church of Scotland	6
Ezra Brown	Methodist	2
		53*

From 1844, the annual return of population appears to have been discontinued, and only occasional information on the subject is available. Smith's Canadian Gazetteer, in 1846, reported that Sydenham contains a grist mill, sawmill, store and about 150 inhabitants.

In 1853, Mr. John Lynch, of Brampton, wrote a report on the state of agriculture in the County of Grey, in which he referred to the village of Sydenham in two short sentences, saying a courthouse and gaol are under construction, and it contains about 400 inhabitants.

In the same year, the Toronto Globe published an account of the new settlement on Owen Sound, from which the follow following paragraphs are taken.

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* Ontario Provincial Archives. Crown Land Papers: Shelf 62, No. 24. Population Return: December 31, 1844.

"Owen Sound is about fourteen miles long, and nine wide at the mouth. The water is deep. Vessels winter here with perfect safety. In stormy weather they are quite safe when they once get well into the bay. Owen Sound was first settled no longer since than 1840: and for two or three years it was considered as all but out of the world. It has now 1000 inhabitants,* and is increasing every year in an accelerated ratio. A road is now opened from this point to Saugeen on Lake Huron. It was mainly a Government work. There are now seven vessels owned at Owen Sound. Their names are: The Owen Sound, Sydenham, Christiana, Jane of Leith, Eliza White, Ann Jane, and the Sophia. The Sydenham River which empties into Owen Sound, affords one of the best water powers in Upper Canada. The fall is not so great just near the Sound as it is about a mile and a half higher up. From that point upwards there is in about a mile's distance an aggregate fall of 700 feet. The water power may in fact be said to be inexhaustible; a fact of great future importance to the prosperity of Owen Sound. Trout is abundant in this river.

"The Owen Sound settlement opened by the Commissioner of crown lands in 1846,† has filled up with a rapidity that might challenge comparison with the most magical experience of American settlement. Great credit is due the agent at Durham, Mr. George Jackson,** for the activity and energy he has carried into the management of the trust confided in him. And we must take into account the description of persons by whom these settlements have been filled. They are by no means the raw emigrants we are accustomed to regard as the denizens of a new forest settlement; but many of them are well-to-do farmers and the sons of Canadians, who have all their lives been accustomed to the kind of life they there find. In fact this settlement witnesses the commencement on a comparatively small scale indeed, of the phenomena long observed in the United States where there is a constant immigration from New England, and other old settlements to the far west. To the sons of Canadian farmers on the Bay of Quinte and other old settlements, the Owen Sound settlement has proved the far west of Canada. Hence its rapid progress is in a great measure explained."††

In 1856, an Act of the Provincial Legislature was passed "to incorporate the Town of Owen Sound, in the County of Grey." According to the preamble to the Act, the proposed town had, in December, 1855, a population of 1,945. The Act, known as "19 Victoria, chap. 18", was assented to on May 16, 1856, and became effective the first day of January, 1857.

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* This figure is presumed to refer to the Owen Sound Settlement, Northern Division, which extended as far south as the present Town of Durham.

† Probably an error for 1840.

** Mr. George Jackson, in 1848, succeeded Mr. John Telfer as Government Agent, and removed his office from Sydenham to Durham.

†† Toronto Globe, Feb. 26, 1853: page 99, cols. 3-4.

One of the tasks that faced the new-fledged town was the improvement of its harbour. It had long been recognized that, between the site of the town and the deep water of the sound lay a mile or two of swamp and debris-filled river that seriously interfered with the commercial exploitation of the otherwise excellent harbour provided by the sheltered sound. In 1859, work was begun upon a dredging project designed to bring shipping to the site of the town. A year later, the Department of Public Works was able to report that the harbour improvements were nearly completed.

The first railway to connect Owen Sound with Toronto was that of the Toronto, Grey and Bruce Railway Company. The company was incorporated by an Act of the Legislature, assented to March 4, 1868. About five years later, in 1873, the first train on the new line arrived at Owen Sound, to the accompaniment of great celebrations as noted in the preceding chapter. In 1883, this line was merged with the Canadian Pacific Railway.

Another line of railway operating to Owen Sound is the Owen Sound Branch of the Canadian National Railways, formerly part of the Georgian Bay and Lake Erie Division of the Grand Trunk Railway, opened for traffic in 1882.

The "Historical Sketch of the County of Grey", published in 1880, described Owen Sound as an enterprising and modern railway town with a population of 4,548, situated at the mouth and on both sides of the River Sydenham. The harbour is one of the chief features of the place and is frequented by all the Georgian Bay and Lake Superior steamers, and there is a daily communication by boat with Wiarton. At one time there was considerable ship-building but this has declined in recent years. A thesis presented to the University of Toronto in 1947 provides an account of the development of Owen Sound during the 40-year period from 1872 to 1912. In the first 20 years of this period nine steamboats were built and many overhauled and repaired in Owen Sound, which had the only drydock on the Upper Lakes. Two grain

elevators were built, the first with a capacity of 250,000 bushels and the second 800,000. Sawmilling was Owen Sound's chief industry but as the timber gradually disappeared, sawmills were replaced with furniture factories. Ironworks and machine shops were required to provide the ships with fittings. During the last decade of the 19th century, the manufacture of cement from marl in a number of small lakes such as Shallow Lake, Williams Lake and McNab Lake was a major industry. After 1900, industry spread to the east side of the bay. However, the year 1912 marked the beginning of a slump in Owen Sound's prosperity, when the C.P.R. Railway moved its terminus to Port McNicoll.

In 1920 Owen Sound became a city. During the twenty-year period from 1911 to 1931, the population of Owen Sound remained almost stationary. From 1931 to 1951, it increased by 28 per cent; and, according to figures published in January 1959, the climbing trend continues and the population is now 17,700.

2. Meaford

The survey of the Township of St. Vincent was begun in 1833, and completed in 1835. As settlement progressed, and the need for roads, harbours, and other communication services began to be felt, "Sundry Inhabitants of the Township of St. Vincent" petitioned the Provincial Government to reserve Lot No. 16, in the 5th Concession, at the mouth of the Bighead River, as a landing place. When, in 1837, the petition was referred to the Surveyor-General for his report and recommendation, that officer pointed out that the lot in question was already a reserve, being one of the lots reserved for "the support of a Protestant Clergy"; in other words, a Clergy Reserve, but he recommended it for a town site.

In this recommendation the Executive Council concurred, and the site of the future town of Meaford was set apart for that purpose.

This house in Leith was probably not built before 1850. It is however, one of the older frame buildings in the area.

This fieldstone house in Annan Village stands on land granted to John Telfer in 1841 and was built about 1860.

Fieldstone house on a prosperous farm in the Beaver Valley, north of Kimberley. This house is a florid example of the style of the late 1870's,

When more than a year had passed, and the inhabitants of St. Vincent once again addressed a petition to the Government, it was to pray that "a Town plot may be laid out at Big Head River in the 5th Concession of Said Township." Their prayer was not granted immediately and it is possible that the reluctance of the Government to proceed with the survey of this town plot lay in the disturbances and unrest that marked the year 1838. It was a year of much friction and unfriendliness between Canada and the United States, marked by hostile demonstrations and destructive raids; and there were many in Canada who feared that large-scale invasion was imminent. The remote shores of St. Vincent seemed particularly vulnerable and unprotected.

It was not until 1845 that the next step was taken to have the site of Meaford surveyed. On April 11th, of that year, the Executive Council considered a petition from the inhabitants of the Township of St. Vincent and accordingly, on May 26, 1845, the Commissioner of Crown Lands, whose office was then located in Montreal, issued his instructions to Mr. William Gibbard, Deputy Provincial Surveyor, to survey the town plot of Meaford and determine whether or not there were any millsites close by on the Bighead River.

The name of the town is appropriately related to the name of the township. Sir John Jervis, in 1797, had been made Earl St. Vincent for his victory over the Spanish fleet at Cape St. Vincent in Portugal. The township was named in his honour. Meaford, in Staffordshire, was his birthplace and the family seat; and the town to be laid out in the Township of St. Vincent was, accordingly, also named in honour of the same hero.

The survey of the town plot occupied William Gibbard from June 23 to September 2, 1845. For some reason not accounted for, there was a delay of more than a year in bringing the town lots into the market and disposing of them.

It was not until after January, 1847, when the Commissioner of Crown Lands submitted a statement of valuation of

the town lots in Meaford, and the Executive Council authorized "that the Lots be advertized for sale" that it became a small grain-exporting port.

In 1880 it included eight hotels, two grist and two sawmills, one of each being run by steam, two tanneries, two woollen mills, a foundry and machine shop and numerous other factories of lesser note, besides the usual complement of stores, shops and a weekly newspaper, The Monitor.

In 1874, according to the preamble to the Act of incorporation, Meaford had "a population of 1,500, or thereabouts". The growth of the town in the ensuing decades was intermittent. The 1959 Municipal Directory, published by the Ontario Department of Municipal Affairs, gives the population of Meaford as 3,640.

CHAPTER 7

MILLS

Wherever the pioneer settlers of Upper Canada established their earliest communities, their enterprise was accompanied by the demand for mills. One of the settler's earliest needs was for lumber with which to build himself a house and a shelter for his cow, his ox, and his pig.; and as soon as the first harvests had been gathered came the need for grist mills. Since the mills, whenever possible, were operated by water power, it was an important part of the instructions to surveyors to note and report all potential mill sites.

Some settlers considered the operation of a grist mill so important that they thought the Government ought to build and maintain it, or, at least, to grant assistance to the miller who would undertake to provide the community with such essential services. Thus, in 1838, when "Sundry Inhabitants of the Township of St. Vincent" were petitioning for the laying out of a town plot, they included in their petition the prayer "that a sum of £1000 may be granted towards the erection of a Grist Mill in that Township". The Government, in this instance, declined to make the grant.

Two years later, when the Executive Council recommended the immediate opening of the Owen Sound Road, it asked the Commissioner of Crown Lands not only to report upon the "specific Kind of Road proposed by him, and the probable expense of opening it", but also on the feasibility and cost of erecting mills. The Commissioner, the Honourable R. B. Sullivan, in his report dated September 24, 1840, referred to the absolute necessity, but not to the probable cost, of mills in the Owen Sound Settlement.

John Telfer, busily engaged in erecting three houses at Owen's Sound for the use of the Government, was interrupted early in November by snow, but continued to cut

the large timbers required for the houses and a mill.

Telfer visited Toronto in June, 1841, and while there wrote a letter to the Commissioner of Crown Lands, whose office was located at Kingston, concerning the promised grist mill at Owen's Sound. When next the subject of the mill was mentioned, in February, 1842, it was to complain that, up to that time, no start had been made.

The subject of mills also formed a considerable part of the report made by Captain A.M.I. Durnford, the Government Agent at Arthur, March 31, 1842, and recommended their construction at Durham, Mount Forest and Arthur.

In April, 1842, John Telfer again mentioned the subject of the Government's intention to build a mill at Owen's Sound and complained of the delay in starting construction.

In the course of the ensuing month, the Owen Sound Settlement was visited by the Honourable Alexander Fraser, of Fraserfield, in the County of Glengarry, who came, as he explained, "in accordance with an arrangement entered into between the Hon'ble R. B. Sullivan, Mr. Davidson and myself", "in order to ascertain, and be enabled to report upon, the Capabilities of that part of the province, with a view to its immediate Settlement". Mr. Fraser's report, dated June 21, 1842, stated that there were many desirable sites and recommended that one be constructed by the Government and later sold to some enterprising settler.

Another letter from Telfer, dated July 25, 1842, contains a number of particular details about the plans of some of the settlers to build mills; unfortunately, the letter is torn, and not all of its comments can be readily understood, but it is clear that a Mr. Elliot applied for permission to erect mills. Evidently Mr. Elliot found that Government action was too slow for his liking, for in September, 1842, John Telfer wrote again on his behalf, saying that he was prepared to wait only one month longer.

In the following January Telfer was still writing about the lack of a grist mill at the Sound; and James McNab, the former Government Agent at Arthur, wrote from that village on August 8, 1843, to say that any wheat that they have raised is but of little consequence because there are no mills.

Two years more went by; and, except for the none-too-satisfactory mills at Arthur and at Mount Forest, the demand for mills was not met at any point on the Owen Sound Road. In 1845, however, the Government directed Charles Rankin to examine the several mill sites bordering on the road, and to report his findings. Rankin's report was dated March 7, 1846; and, for the first time, the Government was in possession of reliable information on which to base constructive action. The sites that Rankin recommended were advertised for sale, and intending builders of mills were led to make inquiries. A Mr. John Newton requested permission to erect a woollen factory and sawmill.

The records do not show that Mr. Newton's proposals were acceptable to the Government, or that he ever became the proprietor of a mill in the Owen Sound Settlement.

In the meantime, two of the leading citizens of "Sydenham Owen Sound" had written, in November, 1846, to the Commissioner of Crown Lands, then at Montreal, to protest against the indiscriminate sale of potential mill sites to speculators, who kept good water power from being used, and increased the cost of bringing mills into operation. They referred particularly to the person who had purchased the site on the Sydenham River.

In the following pages will be presented such information respecting the mills of the North Grey Region as it has been possible to assemble. This information is often meagre and unsatisfactory, but is occasionally full and complete. The sources of information most frequently consulted are those referred to in the accompanying index list.

(1) Smith's Canadian Gazetteer, 1846
(2) W. H. Smith: Canada, Past, Present, and Future, 1851
(3) Lovell's Canada Directory, 1857
(4) Mitchell's Canada Gazetteer and Directory, 1864
(5) W. W. Smith: Directory of the County of Grey, 1865
(6) Ontario Gazetteer and Directory, 1869
(7) Historical Sketch of the County of Grey, 1880
(8) Farmer's and Business Directory of the Counties of Grey, Ontario, and Simcoe, 1887
(9) E. L. Marsh: History of the County of Grey, 1931
(10) Dominion of Canada Topographical Maps, 1944
(11) Photographs, Ontario Department of Planning and Development, 1957
(12) List of mills and dams, Ontario Department of Planning and Development, 1958
(13) Ontario Provincial Archives, Crown Land Papers various dates.

Mills in Artemesia Township

The earliest mills in Artemesia were built at Eugenia, where "the Messrs. Purdy" commenced operations in 1858. In that year they built a house and made a small clearing near the brink of the falls. The sawmill was built in 1859, and the flouring mill put in operation in 1860.

W. W. Smith (5) says the grist mill is 45 x 35 feet, 3½ storeys high and contains two run of stones.

Mitchell's Directory (4) supplies the names of the Messrs. Purdy: Alexander Purdy, proprietor of a sawmill; William Purdy, proprietor of a Flour and Grist Mill; and R. McLean Purdy, proprietor of a woollen mill.

The directory of 1865 (5) lists the following persons in connection with these mills.

Hislop, Adam	Miller, Eugenia Mills
Purdy, Alexander	Proprietor, Grist and Saw-Mills
Purdy, R. McLean	General Merchant, Postmaster

According to Marsh (9), "Several dams were built on the river above the falls, and small industries were established. However, the town-lot 'boom' declined, and the mills gradually slowed down in their activities, some going out of business in a very short time."

In 1873, Alexander Purdy, the proprietor of the grist and sawmills at Eugenia says the village is quite new, contains about 100 inhabitants, three stores, post office, tavern, school, churches, grist mill, woollen factory building

and dam waiting for someone to put it in operation; two sawmills and a shingle mill now being erected. He goes on to say his mill has a 5-foot circular saw driven by a water turbine and that there is enough water to run several mills.

W. W. Smith (5) describes Flesherton as a "growing village .... at the intersection of the 'Toronto and Sydenham' and 'Durham and Collingwood' Gravel Roads." After the roads were gravelled the place improved rapidly and by 1851 had a post office, three stores, two taverns, several carpenters, a pump-maker, a blacksmith shop, a sawmill, a carding and fulling mill, two churches, two resident clergymen, and a resident physician. The same authority, in his directory, lists, among others, the following:

Campbell, Peter	Carding and Fulling Mill
Flesher, William K.	Proprietor Sawmill
Houx, Ward	Pump and sieve maker

The year before that, according to Mitchell's 1864 Directory (4), there had been, in Flesherton:

James Beachell	Proprietor of a sawmill
P. Campbell	Proprietor carding and fulling mill
Roger Leon	Proprietor of a flour mill

A dam at Flesherton was listed in 1958 (12) and the topographic map published in 1944 shows two grist mills, one at Flesherton, the other about one mile downstream, on the Boyne River.

Mills in Collingwood Township

The principal centres of milling activity in Collingwood Township were at Thornbury and Clarksburg, within a mile or two of the mouth of the Beaver River.

In the year 1848, Solomon Durkee Olmstead, of Carleton County, came with his family into Collingwood Township, and undertook to build a sawmill in the town-plot reserve at the mouth of the Beaver River, which could cut 500 feet of lumber in 12 hours. There were in 1857 about one hundred inhabitants, a good general store, blacksmith, cooper and fanning mill shops, grist and sawmills and post office.

Solomon Olmstead's means were limited, and, in various accounts, he appears sometimes in, and sometimes out of, business. In 1853, he built a grist mill with two run of stones at Thornbury, which was still in operation in 1865.

In 1853 the village had a post office, two stores, a grist and flouring mill, a sawmill; two taverns and a brickyard.

The village of Clarksburg, which is adjacent to Thornbury on the south, had its beginnings in 1856, when W. J. Marsh settled there on land he had acquired from the original grantees. In 1859, W. A. Clark purchased of Marsh a water privilege on the Beaver River, and proceeded to build a woollen mill and a residence. The following year, in 1860, John Tyson bought part of Clark's privilege and built a flour mill and woollen mills. The woollen mills would work up to 80,000 pounds of wool per year. Four years later he built a sheepskin factory for dressing skins, so that they were no longer exported to the United States "in pickle". Carding and fulling was also carried out in the mill which produced tweeds, fulled cloths, beaver cloths, blankets and flannels.

The Thornbury "Standard-Reflector", of Christmas 1901, states that Tyson's flour mill had become the property of Mr. Haines; and that, in addition to the flour mill and the woollen mills, Clarksburg contained two sawmills, a planing mill, a foundry and machine shop, a wood-rim and skewer factory, and a basket factory. The same writer (1901) refers to Telfer Bros., of Collingwood, as the owners of the Clarksburg Woollen Mills, and adds; "since 1895 the business has steadily increased, the mills now using 156,000 lbs. of wool for blankets each year."

In addition to the mills in Thornbury and Clarksburg, W. W. Smith (5), in 1865, listed four sawmills in Collingwood Township:

Thornbury Sawmill	Riddell & Murdy, proprietors
Cumming's Sawmill	one-half mile above Clarksburg
Wilson's Sawmill	two miles above Clarksburg
Stottenburg's Sawmill	on Mill Creek, near Ravenna

The same Authority (5) described Ravenna as having a post office, a blacksmith's shop and shoemaker's shop and two sawmills in the neighbourhood.

In 1880, the Historical Sketch of the County of Grey (7) showed six sawmills and one grist mill in this township, located as indicated in the following list.

On Lot 20, Con. II	at Craigleith	sawmill
On Lot 7, Con. VIII	at Kolapore	sawmill
On Lot 13, Con. VIII	near Ravenna	sawmill
On Lot 15, Con. XI	near Redwing	sawmill
On Lot 26, Con. XI	2 mi. S. of Clarksburg, sawmill, Sephos Goode, propr.	
On Lot 30, Con. XI	near Clarksburg, sawmill (this is probably the sawmill known as "Cummings' Sawmill")	
On Lot 13, Con. XI	grist mill, near Redwing	

Mills in Derby Township

The Assessment returns of Derby Township, 1848, showed one grist mill and four sawmills in the township, and the Census returns of 1850 showed two grist mills and two sawmills, though the individual mills were not identified.

The Minutes of the Executive Council, October 23, 1849, contained a list of the names of fifteen settlers in the Township of Derby, on lots fronting on the Garafraxa Road, to whom they recommended that patents should be issued. Among them is the name of Archibald McNab, on the north-west part of Lot No. 11, together with the notation, "sawmill in operation". The location is at or near Inglis' Falls, but no other reference to McNab's connection with this mill site has been found.

Smith's Gazetteer and Directory, 1865 (5), gave an account of the two grist mills in Derby Township, namely, Inglis' Mills and the Derby Mills.

The Inglis' Mills consisted of a grist mill with two run of stones and a sawmill. Through several directories, Mr. Peter Inglis was listed and designated as follows:

Flour mill at Walter's Falls from the gateheud of the dam. John Walter built a sawmill on this site in 1853 and added a grist mill in 1854.

Sawmill and grist mill at Massie built about 1859. The present sawmill is in part of the old grist mill, which has been enlarged by raising the roof a few feet.

Sullivan Mills on the Sydenham River in Sullivan Township, "Elliott's Mills", were built in 1859.

1857: Lovell's Canada Directory. Ingles, Peter, clerk of County court, Deputy clerk of Crown, and registrar of Surrogate Court.

1864: Mitchell's Canada Gazetteer, Inglis, Peter, deputy clerk of crown, flour, grist and sawmill proprietor.

1865: W.W. Smith's Gazetteer and Directory of the County of Grey. Inglis, Peter, Proprietor Grist and Sawmills.

1869: Province of Ontario Gazetteer. Inglis, Peter, mill proprietor, Clerk Surrogate.

1887: Directory of Grey, Ontario and Simcoe. Inglis, Peter, miller.

W. W. Smith (5) described the Derby Mills as two miles south of Owen Sound and consisting of a grist mill and oatmeal mill, with one run of stones for each department.

Further information respecting these mills may be gathered from the directory list that accompanied the foregoing description, which included the following.

Dickson, Robert, Lessee Derby Mills
Galbraith, Adam, Miller
Johnson, J. & D. (James Johnson and David Johnson), Proprietors Derby Mills.

E. L. Marsh (9) states that David and James Johnston (sic) built a cheese factory "which they operated for many years".

According to Smith's Gazetteer and Directory of the County of Grey, 1865 (5), there were in Derby Township at that time five sawmills, namely Coulter's sawmill, on the Centre Road (between Lots 9 and 10), on a branch of the Pottawatomi River, five miles from Owen Sound; Jones' Sawmill, at the falls of the Pottawatomi River, on the Owen Sound-Southampton road, two miles west of Owen Sound; Inglis' Sawmill, at Inglis' Falls; Herriman's Sawmill, on the Centre Road, three miles from Owen Sound, on the Sydenham River; and Cross' Sawmill, on the Sydenham River, below Inglis' Falls, two and a quarter miles from Owen Sound.

Jones' Sawmill, according to Marsh (9) was equipped with an upright saw set in a frame; operated by one

man; its capacity was 3,000-4,000 board feet in 24 hours.

Herriman's Sawmill, located on the north-west quarter of Lot 9, in the 1st Concession, was among the earliest to be built in Derby Township. In 1849, several of Herriman's neighbours in the 1st, 2nd, and 3rd Concessions complained of injury done to their properties by water "thrown back upon the Land by a Mill-Dam erected on the Sydenham River, near the North-westerly limit of Lot No. 9 in the first Con: of the above Township".

As no subsequent mention of these grievances has been found, it is not known how they were adjusted.

The Historical Sketch of the County of Grey, 1880 (7), showed eight mills on the map of Derby Township:

Sawmill on Lot 9, Con. I (Herriman's)
Sawmill on Lot 11, Con. I (McNab's)
Sawmill on Lot 17, Con. IV (Jones')
Sawmill on Lot 9, Con. VI (on the Pottawatomi River)
Woollen Mill on Lot 10, Con. I (at Inglis' Falls)
Gristmill on Lot 10, Con. I (at Inglis' Falls)
"Old Mill" on Lot 12, Con. II (not on water power)
Oat Meal Mill on Lot 18, Con. III (Maxwell's)

Mills in Euphrasia Township

The original Walter's Mill was built in 1850, on Lot 30, Concession X, of Euphrasia Township. A stone from this grist mill is preserved as a monument in a park on Bayfield Street, Meaford; beside it is a stone tablet bearing an inscription, which reads:

MILL STONE
1 used by JOHN WALTER 1
8 in old mill 11th line 9
5 EUPHRASIA TWP. 5
0 presented by 0
Clarence & Ethel Walters
residing on original mill site

According to W.W. Smith, 1865 (5), John Walter built his sawmill in Holland Township, at Walter's Falls, in 1853, and his grist mill in 1854 or 1855; and a carding and fulling mill in 1856.

The History of the County of Grey (9) states that, in the early sixties, Mr. Purdy and Mr. Walling built the

first flour mills in the township.

In 1865, according to Smith's Gazetteer and Directory (5), there was, in the south end of the township, five and a half miles from Eugenia, on the Fourth Line, a sawmill, "lately erected", the property of William Purdy, of Eugenia. Not far from Purdy's sawmill was another, on the Fifth Concession, belonging to John Hurlburt. "George Reid's sawmill is on Lot 25, in 7th Concession." The Directory added that there were no other mills in the township.

Two passages in a paper written in 1952 by Mr. T. G. Idle, of Thornbury, relate to mills in Euphrasia. No independent confirmation has been found for the particulars they contain. He stated that a flour mill and sawmill were once operated at Kimberley and that a gang sawmill was erected at Heathcote in 1860 which ran till 1875.

The Historical Sketch of the County of Grey, 1880 (7), on its map of the Township of Euphrasia, showed the following mills and mill sites.

Sawmill on Lot 23, Con. I (Heathcote)
Sawmill on Lot 6, Con. IV (not on water power)
Sawmill on Lot 23, Con. IV (not on water power)
Three sawmills on Lot 6, Con. V (at Kimberley)
Sawmill on Lot 7, Con. VII (Wodehouse)
A dam on Lot 25, Con. VII (near Rocklyn)
Steam sawmill on Lot 10, Con. II (near Duncan)
Grist mill and dam on Lot 6, Con IV (near Kimberley)
Grist mill and dam on Lot 25, Con. IV (Fairmont)

Mills in Holland Township

According to the Assessment returns of 1848, there was at that time one sawmill in Holland Township. In 1850, the Census again showed one sawmill in this township, presumably the same one. In neither case is the sawmill identified.

Smith's Gazetteer and Directory (5) showed three grist mills in Holland; Walter's, Massie's, and Conger's; and gave an account of each.

John Walter built a sawmill on the south branch of the Bighead River in 1853, a grist mill in 1854, and fulling

and carding mills in 1856. The drop in the river at Walter's Falls and vicinity was said to be sufficient to provide power for several mills.

The hamlet of Massie began to be settled about 1853, and 10 years later contained a post office, grist mill, sawmill and school.

Spey Mills were built by R. B. Conger on the Spey River. They consisted of a grist mill with one run of stones and a sawmill with a capacity of 3,000 board feet in 12 hours.

The same directory named four sawmills in the northern part of Holland Township:

Conger's, at Chatsworth
Massie's, at the intersection of the road between Lots 7 and 8, and the road between the Sixth and Seventh Concessions
Walter's, at Walter's Falls
Ceasor's, location not given

and one additional sawmill was in process of being built.

In the southern and central parts of the township, there were three sawmills in 1865, namely, Kilburn's, Hamilton's and Lawless's. Conger's grist and sawmills at Chatsworth were listed in Mitchell's Canada Gazetteer and Directory, 1864 (4).

Mills in Osprey Township

W.W. Smith (5) described the village and the mills of Feversham, the principal centre of population in Osprey Township in 1851, and says the grist mill has two run of stones and the sawmill which is a first-class mill will turn out 4,000 board feet of lumber in a day.

Edward Horton's saw and flour mills were listed in Mitchell's Directory, 1864 (4). The Ontario Gazetteer and Directory, 1869 (6) described Feversham as "a Village on the Beaver River, in the Township of Osprey"; the names of eighteen residents were listed, but there was among them no mention of either mills or milling.

The Historical Sketch of the County of Grey, 1880 (7), showed only one sawmill in the northern part of Osprey, located on Lot 13, Concession VIII, about a mile southwest of Feversham.

The History of the County of Grey (9) states that Richard Heron built a dam and a sawmill about a mile and a half from Feversham (without indicating in what direction), where his son William Heron later added a woollen mill. According to Mr. T. G. Idle, of Thornbury, Heron's mill was upstream, that is, east of Feversham.

Mills in St. Vincent Township

The Executive Council of Upper Canada, on January 5, 1837, granted permission to Mr. Price Mallory, for location, in the name of his deceased father, Lemuel Mallory, of Lots 19 and 20 in the 6th Concession of St. Vincent, on condition that he build a mill.

Nearly four years later, in November, 1840, Henry Sullivan, Provincial Land Surveyor, carried out an extensive inspection of the settlement in St. Vincent Township, and of the improvements made by the several settlers. His report described conditions as very poor and lists only one mill.

Between 1840 and 1846, there must have been some improvement in meeting the milling needs of St. Vincent. In the latter year, Smith's Canadian Gazetteer stated that: "There are two grist and two saw mills in the township".

By 1848, the Assessment returns for St. Vincent Township showed two grist mills and three sawmills. And the Census of 1850 reported, in the same township, three grist mills and four sawmills. None of these sources of information provides any means of identifying the mills so returned.

When the Township of St. Vincent was surveyed, Lot 16, in the 5th Concession, was reserved as the site of a town; and this later became a part of the present town of Meaford.. The lot thus reserved included a mill site, on the Big Head River.

On the north half of the adjacent lot to the south, No. 15, there was another potential mill site. This north half of Lot 15, Concession V, was patented in 1835 to one Daniel Fraser, of the Township of Ernesttown, on the Bay of Quinte, "as a private in a Troop of Dragoons of the First Regiment of Addington Militia". The mill privilege on Lot 15 came into the possession of Moses Chantler, and with it, apparently, a mill that "was built before Mr. Chantler came to the township at all". It is not clear who built the mill on Lot 15, nor at what date Mr. Chantler bought it, nor at what date he sold it. By November, 1847, it was in the possession of Jesse T. Purdy; who was concerned to find that Moses and George Chantler had made a dam at the mill site on Lot 16, and intended to put up a mill there, which would interfere with the operation of the Purdy mill just upstream. Jesse Purdy wrote a letter of protest to the Commissioner of Crown Lands.

Two years later, the controversy between Chantler and Purdy had not been settled. On October 9, 1849, Purdy wrote a further letter giving particulars of the damage he had sustained as a result of Chantler's operations, namely, that Chantler's dam backed water onto his land to a depth of two feet and slowed down the operation of his mill-wheel.

The letter was accompanied by four affidavits, attesting to the kind and extent of the damage done to the "Property of Jesse T. and Hassard W. Purdy". Joseph Hamilton, Blacksmith, had "seen the wheel covered with water", and the other affidavits confirmed this statement.

In spite of the protests, it appears that Moses Chantler was permitted to build a grist mill on the controversial mill site. The correspondence quoted above leaves the issue undecided; but Smith's Gazetteer and Directory of the County of Grey (5) indicates that both mills were in operation in Meaford in 1865.

Lovell's Canada Directory, of 1857 (3) listed the following millers in Meaford:

Moses Chantler, miller
Lloyd & Ford, millers
Jesse T. Purdy, miller

And in 1864, Mitchell's Canada Gazetteer and Directory (4) named only the following:

J. T. Purdie, miller
A. Thompson & Co., woollen manufactory

Other mills in St. Vincent, listed by Smith's Gazetteer, in 1865 (5), are the following:

C. R. Sing's sawmill, also a Fulling and Carding Mill, on Big Head River (Lot 14, Con. VI), about a mile above Meaford.
The sawmill and rake factory of Messrs. Trout & Jay, (Lot 12, Con. VI).
T. N. Converse's sawmill, (Lot 11, Con. IX).
Marshall B. Purdy'sawmill, (Lot 11, Con. XI).
Carson's mill, a grist and sawmill, in the Township of St. Vincent, on the shore of Georgian Bay, one mile West of Cape Rich.
Creek Mills, a mile north of the centre of the village of Meaford, on the Lake Shore, so called by Mr. Fuller, the original proprietor of the water-power.

The Ontario Gazetteer and Directory, 1869 (6) contained five names of millers at Meaford:

Robert Dickson, proprietor Meaford flouring mills
Jesse T. Purdy, proprietor Flour, Woollen & saw mills
Marshall B. Purdy, proprietor saw mill
John Tyson, proprietor steam sawmill
James Williams, proprietor Meaford Woollen Mills

The Historical Sketch of the County of Grey, 1880 (7), showed two sawmills at Centreville; one at the outlet of the Mountain Lake, in the 8th Concession; an "Old sawmill" on Lot 10, in the 7th Concession; and one sawmill on Lot 11, in the 9th Concession. To these map features, the Sketch adds that in 1833 their nearest base of supplies, as well as their nearest post office, was Barrie, sixty miles distant. This led to the erection of a mill where Centreville now is, and another, erected where Meaford now stands, as well as a carding mill, at a comparatively early date.

Mills in Sullivan Township

In this township mills were operated on three sites. According to Marsh's History of the County of Grey (9), Pringle's sawmill was the earliest, being built by Thomas Pringle in 1854, on a tributary of the Sydenham River. Smith's

Gazetteer (5) gave the location of Pringle's sawmill as Lot D, Concession III.

The sawmill and grist mill on Lot H, Concession III, of the Township of Sullivan, were at first called Elliot's Mills, built in 1859, and later called Hemstock's Mills. Smith's Gazetteer (5) described them as being grist and sawmills on the Sydenham River three miles from Chatsworth.

The third mill site in this township is that of Hinds' sawmill, which stood on Lot 14, Concession III, on the Sydenham River; in 1865 (5) Richard Hinds was the proprietor.

The Historical Sketch of the County of Grey, 1880 (7), showed the grist and sawmills of Mr. Elliot, and Hinds' sawmill, but not Pringle's.

Mills in Sydenham Township

About 1846, John Telfer, the Government Agent of the Northern Division of the Owen Sound Settlement, built a grist mill at the place that he called Leith, about five miles from the village of Sydenham. Later a distillery was erected here and an oatmeal mill was located further down the shore.

The Gazetteer also gave an account of Burncourt Mills, a grist mill with one run of stones and a carding mill, built by John Wilson, and located about three-quarters of a mile to the north-east of Leith, on Lot 30, Concession C, and on the stream known as Keefer's Creek.

Burncourt Mills

Marsh's History of the County of Grey (9) makes mention of an "early" sawmill at Hoath Head. Since there is no water power at this place, the sawmill was presumably operated by steam power.

The history also contained an account of a woollen mill on Keefer's Creek, for which confirmation elsewhere has not been found.

Marsh's History (9) is the authority for the existence of a flour mill, after 1860, at Annan, in Sydenham Township. As Annan is without water power, such a mill must have been operated by steam power.

According to verbal reports of persons long resident in Sydenham Township, there was, in the early 1860's, a sawmill built at Bognor, on Walter's Creek, a tributary of the Big Head River, which continued in operation until after 1950. Marsh, in describing the mills at Bognor, mentions only a flour mill and a shingle mill; to neither of these does he assign a date.

The Assessment returns for Sydenham Township, in 1848, indicated the existence of one grist mill and one sawmill. It seems likely that the grist mill was that of John Telfer, at Leith. The sawmill remains unidentified.

In W. H. Smith's Canada, Past, Present, and Future, 1851 (2), the name of W. Telfer was given as a miller at Leith.

Mitchell's Directory, of 1864 (4), listed three names of persons connected with the mills at Leith.

Adam Ainslie	grist and flour mill proprietor
Stephen La Berge	miller
Charles La Berge	miller

Mitchell also listed a mill owner at "Johnston", presumed to be the place which, on modern maps, is called Johnson Harbour, at the mouth of Johnson Creek, about a mile west of Vail's Point:

Lindsey Anderson	saw, flour & grist mill owner

Mills in Owen Sound

In 1848 the Harrison flour mill at Owen Sound was built, and later enlarged to contain three run of stones. Business increased with the increase in wheat production and flour was shipped to Collingwood. The Harrison sawmill was an early development in the town, and the shipment of wood and lumber to Collingwood became increasingly important. The first grist mill in the district was still standing in 1920 as part of Harrison's woollen mill.

Sir Richard Bonnycastle, in his book entitled "Canada and the Canadians", published in London in 1849, stated that there were at that time two flour mills and two sawmills in operation in Owen Sound. He did not identify them.

In 1854, Mitchell's Canada Gazetteer and Directory (4), listed the following millers and mill proprietors in Owen Sound:

David Butchart	saw mill proprietor
Harrison & Bros.	Millers
Mr. Hodgkiss	saw mill proprietor
Peter Inglis	flour, grist and sawmill proprietor
Samuel Jones	saw mill proprietor
Lockhart Ormiston	saw mill proprietor

Smith's Gazetteer and Directory of the County of Grey, 1865 (5), contained the following account of the Harrison Mills, in Owen Sound.

"Harrison's Flouring Mill is a very large and substantial frame building, at the south end of the town, on the Sydenham River. The present building was erected in 1857. It is 100 x 49 feet, 4½ storeys high, including the stone basement storey. It is well finished, and contains three run of stones. The premises are calculated for six run. A large amount of flouring is done at the 'Owen Sound Mills'; the flour being shipped via Collingwood by steamer in summer, and teamed to that town by road in winter.

"Harrison's Sawmill is built upon the most approved modern principles, with large circular saw, lath saws, &c. Average cutting, about 500 feet per hour. The present mill was built in 1863; the old Sawmill being pulled down to make room for it.

"Harrison's Carding and Fulling Mill is situated between the Flouring-Mill and the Sawmill, occupying the stone building formerly used as a Grist-mill. It contains two Carding Mills, and the usual apparatus for fulling and finishing cloth."

In the same Gazetteer and Directory (5), Harrison Brothers advertised their services in the following terms:

"Harrison Brothers, Proprietors, Owen Sound Flouring Mills - carding, fulling, and sawmills, gristing, sawing, carding, fulling and cloth-dressing done to order - William Harrison, Robert Harrison, John Harrison."

In addition to the particulars of the Harrison enterprises at Owen Sound, the Gazetteer and Directory of 1865 gave details of a considerable number of other industrial works; these included two cabinet factories, two breweries, two fanning mills, three tanneries, two pearl ash factories, three ironworks,

four carriage and wagon shops, three cooperages, two brickyards and one melodeon factory. Obviously, Owen Sound was a thriving, industrial town 100 years ago.

CHAPTER 8

AGRICULTURE

The earliest explorers, surveyors, and settlers in the townships that now make up the North Grey Region, seem to have been impressed by the agricultural potentialities of the land. In Chapter 2, of this history, numerous instances have been cited to show the interest that was excited by the great extent of the "generally excellent soil", and by the occasional occurrences of rocky, gravelly, sandy, or swampy areas, noted as "unfit for cultivation". The comments of John McIntosh, previously referred to, probably had their counterpart in the private letters of many of the settlers in North Grey.

In 1851, by an Act of the Legislature, there was set up the Board of Agriculture of Upper Canada; and one of the early activities of the Board was to offer prizes for reports submitted by county agricultural societies, and by others, in general competition. Between 1852 and 1856, the Board awarded prizes to the writers of fifteen county essays, among whom was John Lynch, of Brampton, who was the author of four essays, one on each of Peel, Simcoe, Grey, and Bruce counties. Lynch's "Report on the State of Agriculture in the County of Grey", was written in 1853, and published in the Journal of the Board of Agriculture of Upper Canada, in 1856. It stated that, because of the extensive area of the county, there were great variations in soil. The prevailing soil was said to be rich mellow clay overlying limestone, with a heavy covering of vegetable mould. There was also said to be a lot of bad farming along the Owen Sound Road where settlers had grown successive crops of grain without any attempts at rotation of crops. The writer says that the original settlers are often not the ones who eventually possess the land, but they are succeeded by men with more capital.

The Census of Canada, 1851, showed a total of 34,738 pounds of maple sugar, produced in the nine townships

Round-log barn on an abandoned farm in Sydenham Township near Walter's Falls. A typical two-crib hay barn with a lean-to hog pen, but no trace of a stable.

Barns of this type, extended by a lean-to "aisle" on one side, are common in this area.

Large barns on a prosperous farm in the Beaver Valley north of Kimberley.

that lie wholly or partly in the North Grey Region; and, in 1861, this quantity had increased to 125,391 pounds. These amounts are equivalent to four pounds per head of population, in 1851, and nearly seven pounds per head, in 1861. In the Census of 1871, and subsequently, such returns were made, not by townships, but by electoral districts, or by counties, so that it is not possible to follow the rate of production through the years, with any approach to statistical accuracy. Production for the County of Grey, as a whole, appears to have been at its maximum in or about 1871, when a total of more than 417,000 pounds was reported. In 1941, the corresponding figure was 2,236 pounds. Maple sugar, as a "crop", had practically disappeared from the county.

The "regular system of Agriculture" that John Lynch expected to see emerge in Grey County was never realized, unless diversification and mixed agriculture can be called a system. Wheat and oats, hay and potatoes, turnips and fruit, have, from the beginnings of settlement, held important places in the production and economy of the county; and the changes in the relative acreages of these staple crops have never, in the hundred-odd years covered by available census reports, reduced any of them to insignificant proportions.

According to the Census returns of 1851, wheat occupied nearly half the total crop acreage; and, in 1861, this proportion was increased to between 50 and 60 per cent. The acreage of wheat reached its maximum about 1881, when, in the nine townships of North Grey, the wheat crop occupied 70,656 acres. In the ensuing decades, wheat dropped off rapidly, until, in 1941, the acreage was approximately one-sixth that of 1881.

The acreages of oats and of hay increased steadily from 1851 to 1921 and 1931; after these dates, the acreage of oats fell off very rapidly, and the acreage of hay declined a little. From 1931 on, the hay crop was reported as occupying more than half of the total crop acreage in North Grey.

Over the North Grey Region as a whole, the production of potatoes and turnips has not at any time been of great commercial importance. Both these crops reached their maximum acreage about 1891, when together they occupied less than four per cent of the total crop area.

The low lands bordering the shores of Nottawasaga Bay, and the valleys of the rivers flowing into the bay, especially the Beaver River, were early found suited to the production of fruit. In favoured and sheltered areas, there were produced large quantities of apples, pears, peaches, plums, cherries, and small fruits; and, in part, this production has continued into the 1950's. The census returns give only an intermittent glimpse of what has been, for ninety years, a fairly continuous industry. Some of the census figures are given here for Grey County.

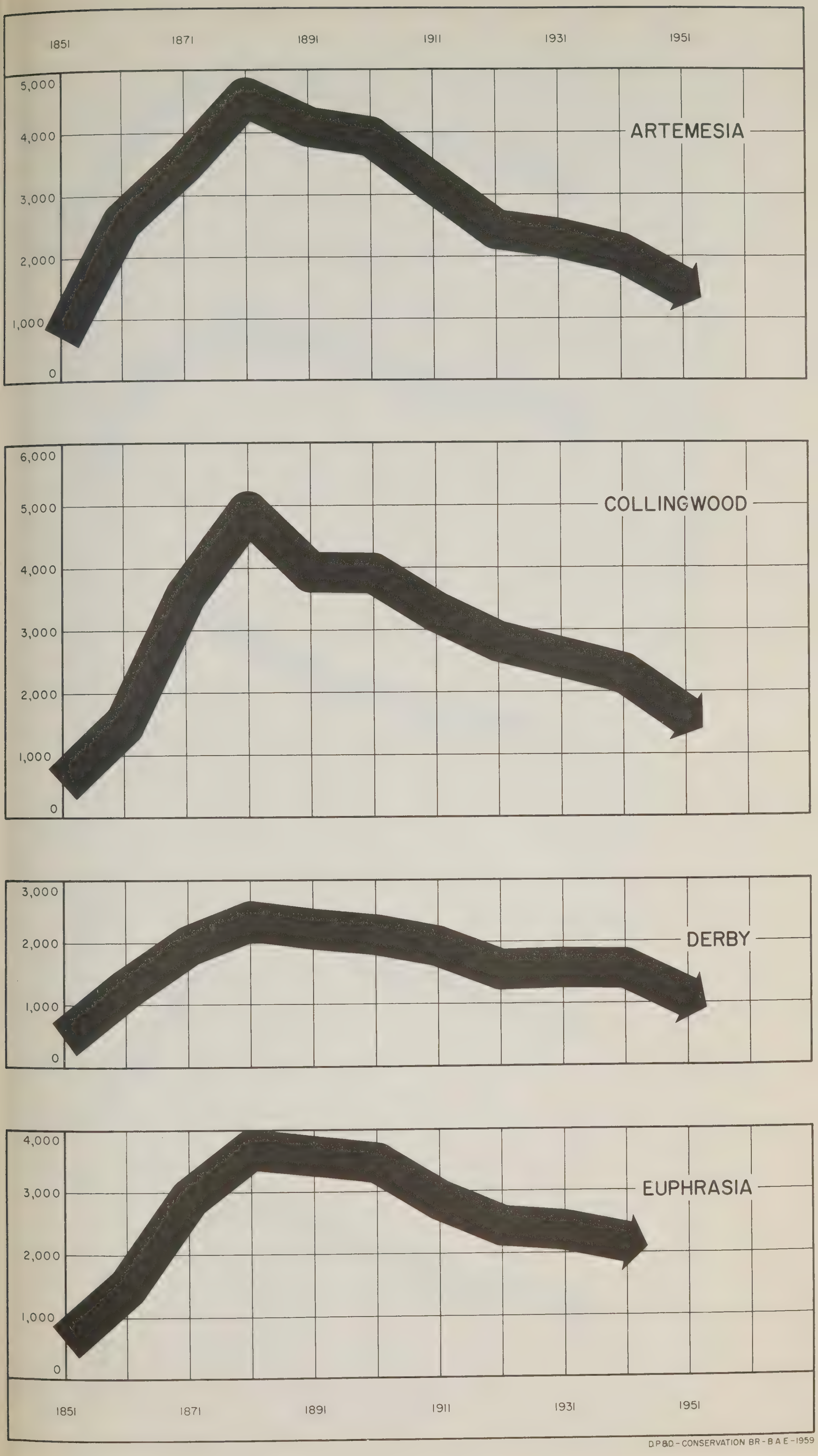
1871 -	Apples, bushels	16,039
	Grapes, pounds	1,634
	Other fruits, bushels	2,723
1881 -	Apples, bushels	105,227
	Grapes, pounds	10,544
	Other fruits, bushels	11,981
1891 -	Apples, bushels	139,160
	Peaches "	25
	Plums "	2,474
	Cherries "	2,397
	Pears "	2,058
	Other fruits, bushels	1,556
	Grapes, pounds	9,807
1901 -	Apples, bushels	77,120
	Peaches "	73
	Pears "	4,004
	Plums "	402
	Cherries "	1,264
	Other fruits, bushels	408
	Grapes, pounds	22,678
	Small fruits, quarts	59,679
1911 -	Apples, bushels	39,157
	Peaches "	213
	Pears "	6,000
	Plums "	4,735
	Cherries "	839
	Other fruits, bushels	80
	Grapes, pounds	19,985
	Small fruits, quarts	41,603
1921 -	Apples, bushels	373,642
	Crabapples "	5,078
	Peaches "	73
	Pears "	2,289
	Plums "	7,217

	Cherries, bushels	1,451
	Grapes, pounds	12,522
	Small fruits, pounds	126,034
1931 -	Apples, bushels	199,540
	Crabapples "	2,743
	Peaches "	60
	Pears "	5,044
	Plums "	5,805
	Cherries "	962
	Grapes, pounds	2,058
1941 -	Apples, bushels	2,145,997
	Peaches "	710
	Pears "	15,665
	Plums "	14,556
	Cherries "	36,482

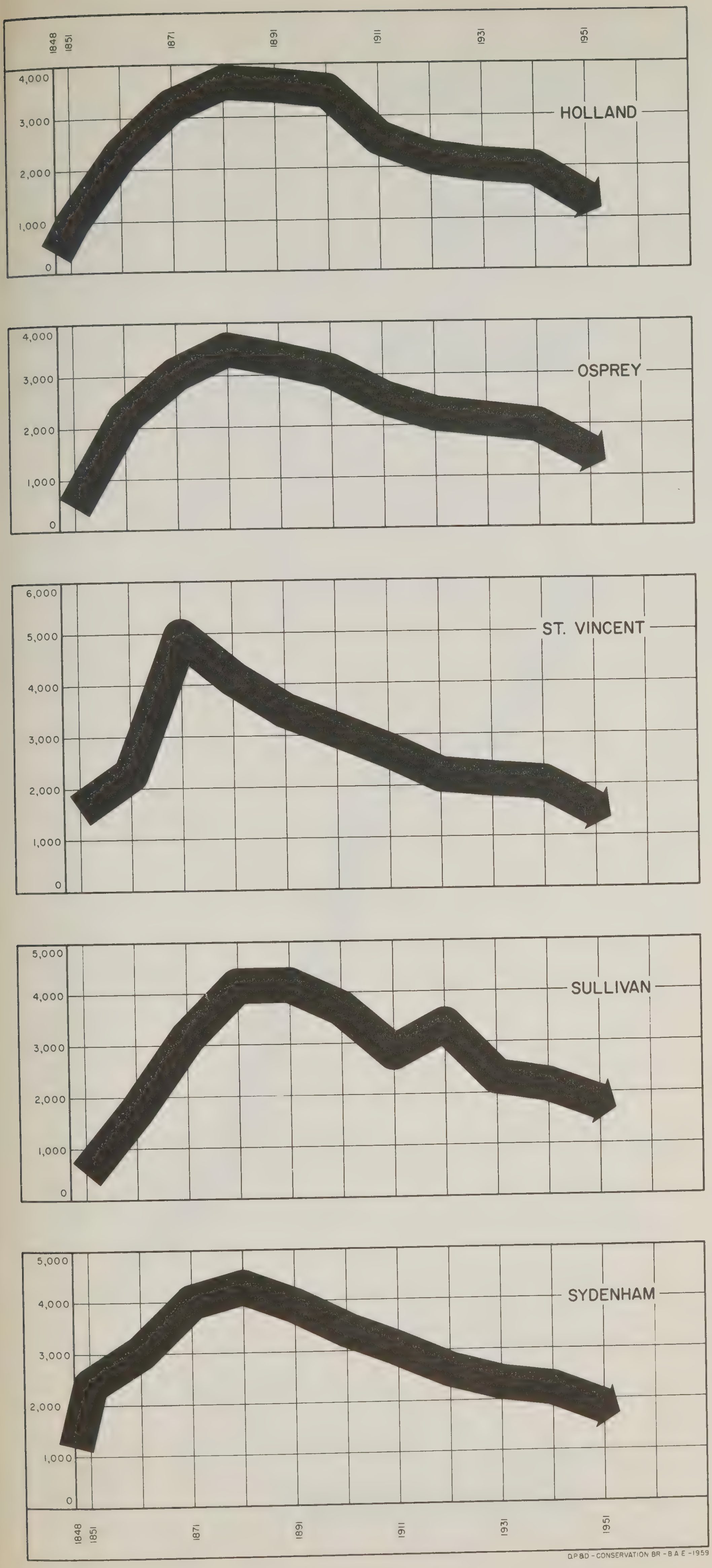
1951 - Not recorded in Census figures.

On the whole, the record of the cultivated crop land in North Grey is that it reached its maximum area about 1911; since that date the acreage has fallen off by about 40 per cent, and the trend is expected to continue.

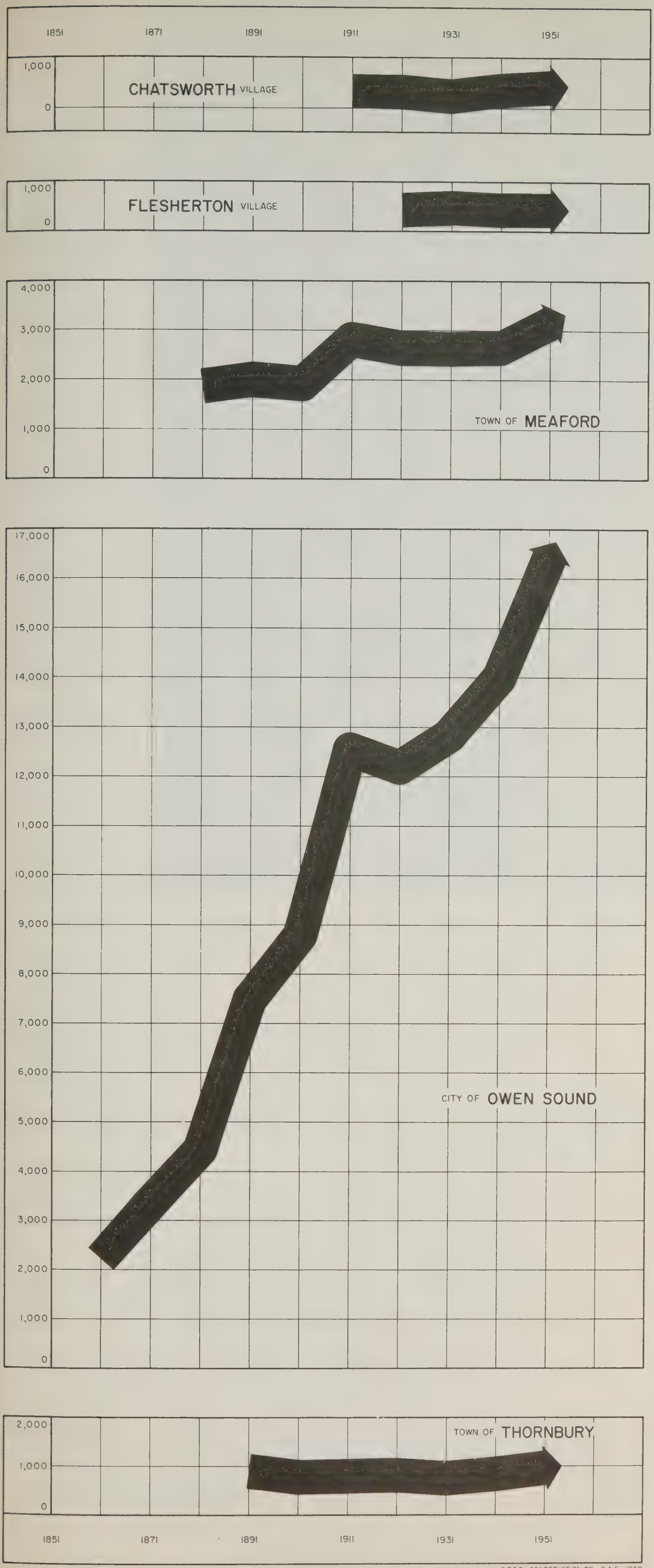
Even before the acreages of the staple crops, discussed above, had begun to decline, Grey County had been recognized as a region favourable for animal husbandry, and a large part of the crop production was utilized in the feeding of livestock. Apart from the fruit-growing areas along the shores of the bay and in the river valleys, the agricultural economy of Grey County, is, in 1959, built around the production of cattle, hogs, and poultry. The "Generally excellent soil" is less extensive than it was at first supposed to be; and, in the diversified economy of the Twentieth Century, it is no longer expected that "this section of country will be one of the finest Agricultural Districts in Upper Canada. In the place of a once-hopeful agriculture, the North Grey Region is now the scene of an increasing, expanding industrial life, in which agriculture plays a supporting role.



TOWNSHIP POPULATION



TOWNSHIP POPULATION



D.P.& D.-CONSERVATION BR.-B.A.E.-1959

POPULATION

NORTH GREY REGION CONSERVATION REPORT

LAND

ONTARIO DEPARTMENT OF PLANNING AND DEVELOPMENT

CONSERVATION BRANCH

CHAPTER 1

GEOGRAPHIC ASPECTS OF THE NORTH GREY REGION

1. Introduction

The drainage area of the North Grey Region Conservation Authority embraces some 415,776 acres or 649.6 square miles of territory and extends, in an east-west direction, from the upper reaches of the Pottawatomi River in the west about 40 miles to its eastern limits near Craigleith. From Cape Rich on Georgian Bay in the north to the southernmost extension near Lake Wilcox is about 36 miles. The highest point in Southern Ontario, nearly 1,800 feet above sea level, is found near Singhampton.

The region is bounded on its northern limit by Georgian Bay and Owen Sound, and on the east, south and west by the drainage basins of the Nottawasaga, Saugeen and Sauble Rivers, respectively. It contains several large streams - the Beaver, Bighead, Sydenham and Pottawatomi Rivers - and many small creeks which flow independently into Owen Sound and Georgian Bay.

The municipalities of the region include the city of Owen Sound (17,485), the towns of Meaford (3,565) and Thornbury (1,065), the villages of Chatsworth (391) and Flesherton (477) and all or part of the Townships of Artemesia, Collingwood, Derby, Euphrasia, Holland, Keppel, Normanby, Osprey, St. Vincent, Sarawak, Sullivan and Sydenham.* All of these municipalities lie within the County of Grey. A small portion of Nottawasaga Township in Simcoe County is also included in the region. There are, in addition, many hamlets. The population of the Georgian Bay townships is increased materially in the summer due to the influx of tourists and cottagers.

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* Population figures where quoted are taken from the 1958 Municipal Directory. Dept. of Municipal Affairs.


GEORGIAN BAY
NOTTAWASAGA BAY
OWEN SOUND
MOUNTAIN LAKE
MEAFORD TANK RANGE
MEAFORD
THORNBURY
C.N.R.
ST. VINCENT
COLLINGWOOD
SYDENHAM
SHEPPARD LAKE
EUPHRASIA
DUNCAN LAKE
OSPREY
BREWSTER LAKE
EUGENIA LAKE
ARTEMESIA
FLESHERTON
WILCOX LAKE
C.P.R.
OWEN SOUND
DERBY
HOLLAND
CHATSWORTH
WILLIAMS LAKE
SULLIVAN
N
MUNICIPALITIES
SCALE : MILES
1 0 1 2 3 4 5
DEPARTMENT OF PLANNING AND DEVELOPMENT
CONSERVATION BRANCH

The watershed is moderately well served by provincial highways and county and township roads but many areas are difficult to reach because of steep valleys, cliffs and swamps. In this, however, lies much of the charm of the area. Topographic and drainage problems also increase the costs and difficulties of road maintenance. The major centres are served by rail and highway facilities which more or less parallel each other.

2. Hydrography

(a) The Beaver River

The largest single river system in the region is that of the Beaver which drains an area of approximately 230 square miles. This river is served on its western flank by short, often intermittent, tributaries, the chief of which are Grier Creek and Wodehouse Creek. These creeks often have their beginnings in small headwater swamps and their descent to join the Beaver River far below is precipitous.

The tributaries on the east are much larger and, for the most part, carry a much greater volume of water throughout the year. The limestones, moraines and outwash deposits furnish many swamps and springs and the cool waters provide excellent habitat for trout. The gradient of most of these streams is shallow on the upland but the declivities are steep where they cross the main slopes of the valley into the Beaver River. In some instances, as at Eugenia, the stream bed is broken by a precipitous fall of spectacular natural beauty.

The system is also fed by several small lakes including Duncan and Brewster, and by a number of small ponds, some of which are maintained primarily for fishing. Eugenia Lake covers approximately 1,400 acres and was constructed some 40 years ago as a reservoir for a hydro-electric power station Flumes carry water to the power house in the valley some 500

feet below. The upper Beaver River downstream from Feversham flows in a narrow gorge about 100 feet deep. This gorge represents a well developed spillway formed by glacial meltwaters.

Both to the east and the west some of the tributaries become disappearing streams during at least part of the year when flows are normally lower. This phenomenon is due, of course, to solution of the limestone bedrock and the fact is disconcerting and inconvenient to those downstream from the point of disappearance who depend at least partly on the flow for their farm operations. The more important of these occurrences may be found near Maxwell on the Little Beaver River and on Wodehouse Creek near Wodehouse. The Conservation Authority may, perhaps, assist in the restoration of the supplies where their disappearance works hardship on those who depend on them, and where such restoration would be economically feasible.

From Flesherton to Kimberly the Boyne and Beaver Rivers follow a fairly precipitous course and the beds are marked by a series of rapids and waterfalls. Between Kimberly and Heathcote the valley bottom broadens considerably and the river gradient becomes very shallow due, mainly, to the fact that the stream flows through a lacustrine plain formed in glacial times as a result of ponding behind the moraine at Heathcote. From Heathcote to the river mouth at Thornbury the stream gradient becomes slightly more acute and the stream course sharper due to incision.

The lack of any major flood problem on the river is no doubt due to several factors, among which may be noted the small amount of urban development on the stream, the lack of major barriers to water flow, the permeable soils and bedrocks, the many swamps and extensive forest cover, and the high proportion of hay and pasture on the improved lands.

(b) Bighead River

The hydrographic network of the Bighead Valley resembles in many ways that of the Beaver Valley. The Western tributaries are small and short compared to those coming in from the east. This distribution is partly due to the fact that the system is bounded on the west for some distance by a rock cliff. Of even more importance, probably, is the fact that the bedrocks dip to the west. This has led to the master streams (Beaver, Bighead, Sydenham and Pottawatomi) taking a lower level near the western borders of their watersheds while the major tributaries flow westward down the dip of the bed-rocks.

Walters Creek, Rocklyn Creek and Minniehill Creek are the major tributaries of the Bighead River and all of them, as with the smaller tributaries, are marked by rapids and falls. The most spectacular falls are found in the gorge at Walters Falls where the power is harnessed to run a sawmill. As on the Beaver River the streams usually find their source in springs and swamps. There are also several "disappearing" streams.

The diverse nature of the terrain in the valley is reflected somewhat in the variable course of the river. The marked change of course at Oxmead is due to a deflection of the river to the east by the huge gravel bar formed by glacial Lake Algonquin. The Sydenham and Bighead Rivers have flood problems of greater severity than does the Beaver River. The Bighead River is a dirtier river than the Beaver, the extra sediment no doubt being due to different soil types and a different intensity of land use, to greater erosion of the stream banks and also to erosion of roadside ditches. Much of the sediment and gravel moved by the river finds its way into Meaford Harbour and its removal entails considerable expense every several years.

(c) Sydenham River

Third largest of the streams in the region, the valley of the Sydenham River is much less well developed than those of the Bighead and Beaver. This is partly due to a somewhat different physiographic history but perhaps the main reason for the lack of deep valleys is the presence of bedrock at or near the surface. A good portion of the gorge downstream from Inglis Falls is undoubtedly referable to erosion by glacial and pre-glacial drainage. The river is similar, in a number of respects, to the portion of the Beaver River above Eugenia Falls.

(d) Pottawatomi River

Although the watershed is much smaller the organization of the river is similar in many respects to the Sydenham. It too enters a downstream gorge via a small waterfall.

(e) Lakeshore Drainage

This group includes a considerable number of small streams independent of the above rivers and flowing directly into Owen Sound and Georgian Bay. Most of these streams are intermittent in their flow characteristics and many have developed deep valleys of some consequence. The unbalanced regimes of these creeks is due, of course, to the fact that they have their origins, for the most part, in limestone, shale or clay plains. The run-off from these areas is high and for short duration. Small dams would undoubtedly be of benefit in retaining water supplies for farm use.

(f) Waterbodies

The principal lake of the region is, as already mentioned, the artificial reservoir of Lake Eugenia. This was constructed some 40 years ago by placing a dam across the Beaver River just upstream from Eugenia Falls. This lake occupies old valley lands and is quite variable in depth. Due to the spring-fed streams entering it the water is rarely warm. The reservoir is undoubtedly useful in helping to regulate spring run-off. Its value for recreational purposes is lowered

somewhat by the cold water from the spring-fed streams, but more particularly by the forest of tree stumps flooded when the reservoir was created. These logs may provide fish cover but are a menace to powered boats. The lake is rapidly developing into a cottage resort area.

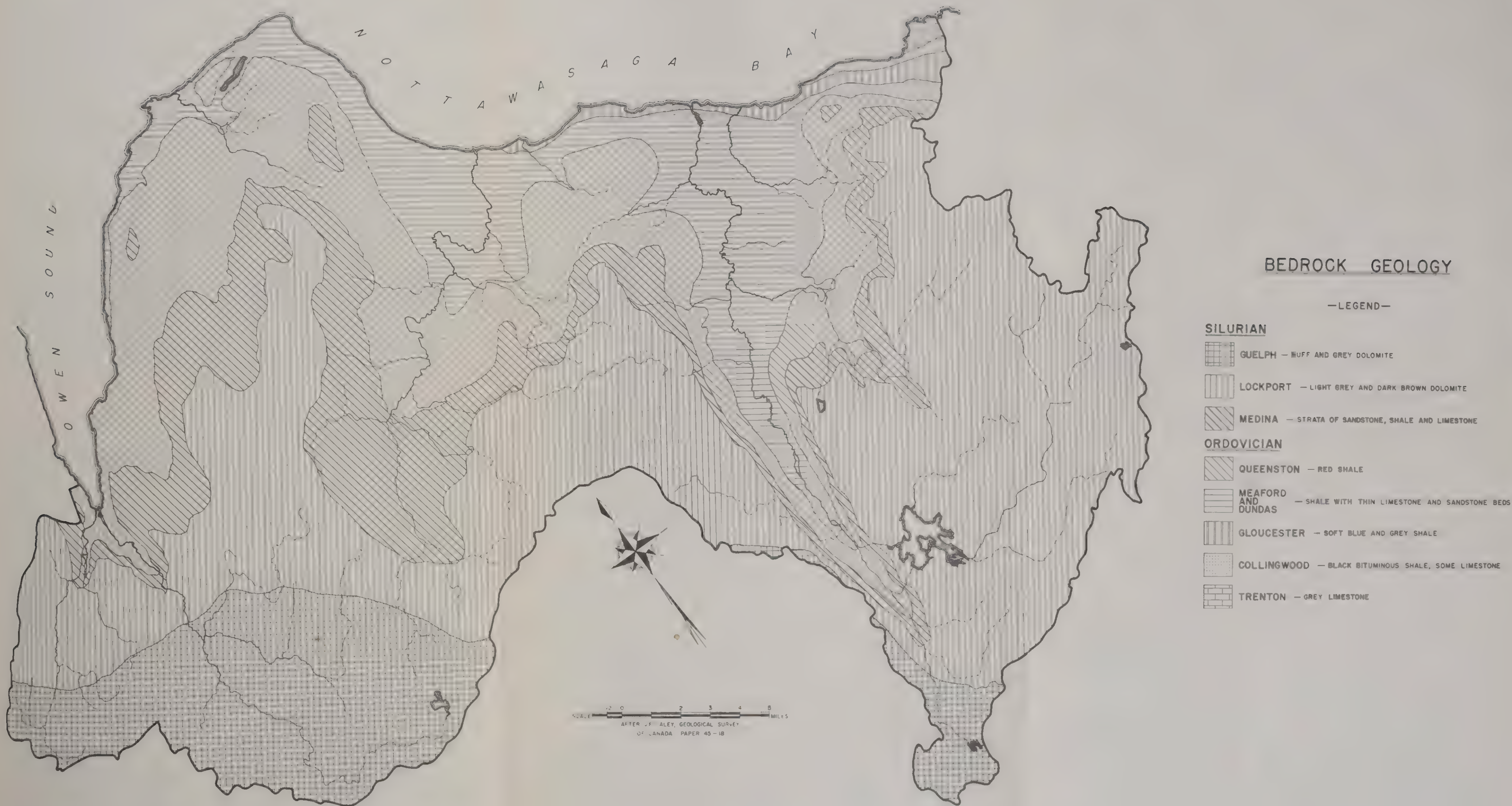
The other lakes of the region are small kettle lakes found in the moraines. An exception is Mountain Lake at Cape Rich. This lake occupies part of a pre-glacial valley and is dammed up by a large barrier beach formed in late-glacial times. The kettle lakes include Wilcox, Brewster, Duncan, Williams and McGill Lakes. All of these lakes serve to some extent as headwater reservoirs and all are used for recreational purposes.

3. Bedrock Geology

The bedrocks of the region are Paleozoic sediments of the Ordovician and Silurian systems. The clays, sands and carbonates, eroded from land masses long ago, settled in epi-continental seas and were subsequently transformed into sedimentary rock by pressure and heat. Internal movements in the earth gradually pushed up these western Ontario sediments into a large dome. The eastern portion of this dome has eroded away to the line of the Niagara escarpment while the remaining portion, of course, dips gently to the south-west.

These sedimentary rocks, and their disposition, are among the more important factors governing the quality and use of the land in the region. The thinly covered limestone plains, for example, intimidate a prosperous agriculture while steep valleys and escarpments hinder communications and transportation. They also contribute to the wonderful scenery of this part of Ontario.

The Trenton limestones and shales are the oldest strata to be seen in the region, while the Guelph dolomites are the youngest. All of these rocks are very old but


NOTTAWASAGA BAY
OWEN SOUND
BEDROCK GEOLOGY
—LEGEND—
SILURIAN
GUELPH — BUFF AND GREY DOLOMITE
LOCKPORT — LIGHT GREY AND DARK BROWN DOLOMITE
MEDINA — STRATA OF SANDSTONE, SHALE AND LIMESTONE
ORDOVICIAN
QUEENSTON — RED SHALE
MEAFORD AND DUNDAS — SHALE WITH THIN LIMESTONE AND SANDSTONE BEDS
GLOUCESTER — SOFT BLUE AND GREY SHALE
COLLINGWOOD — BLACK BITUMINOUS SHALE, SOME LIMESTONE
TRENTON — GREY LIMESTONE
0 2 3 4 MILES
GEOLOGICAL SURVEY
PAPER 45 – 18

older than all of them by far are the basement Precambrian rocks. Many of the limestones and shales are fossiliferous and preserve the remains of ancient plants and animals.

The dark red shales of the Queenston formation underlie a large area of the watershed and outcrop in many places. The prominent greenish-coloured bands in this shale are found along fissures and joint planes and are probably due to bleaching by percolating waters charged with organic acids in solution. This type of rock provides many of the qualities desired for brick and tile making and elsewhere has been extensively quarried for these purposes.

In 1852 Smith also described these rocks.

> " ..... this deposit consists of red marl which is partially striped and spotted with green, interstratified with red, green and variegated purely argillaceous bands, which never exceed six or eight inches in thickness. These bands appear to be entirely devoid of calcareous matter, and are carved by the indians into tobacco pipes."*

Apart from their influence on the scenery, soils and land use of the region, all of which aspects will be discussed in more detail later in this report, the bedrocks have had economic values of modest importance.

Zinc ore is found at the base of the Guelph formation and occurs as scattered crystals or as a fossil replacement. Its presence has been known for many years and quantities have been quarried at several places in the Bruce Peninsula, as long ago as 1910 and as recently as 1943.

It was noted by Smith in 1852 that

> "The Niagara group (of limestones) is fruitful in excellent materials for building and lime burning. At Owen Sound, about two miles S. by E. from the village, there are unworked strata of white or pale gray limestone; the upper beds are from two to four feet thick, the lower ones occasionally over twelve feet, being all very massive; the upper beds could be quarried to an almost boundless extent, and would yield an excellent building material; the lower beds are likewise fit for building purposes, but being at the base of an abrupt escarpment could not be extensively quarried; large loose masses, however, skirt the escarpment and these might be made available for a great length of time. All the beds would stand

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* Smith, W. - Canada - Past, Present and Future. 1852

The bedrock "face" may be exposed in the escarpments, or in roadcuts. This is Lockport dolomite at Woodford and is found above the sandstones, limestones and shales of the Medina formation.

In many areas the soil is thin over the underlying bedrock. Poor, weedy pasture is often the product and the land might be better devoted to trees. Note the solution crack.

"the weather well; many of them have occasionally been burnt by the settlers, and are said to make an excellent quality of lime."*

The bedrocks have not been greatly used since for building and other purposes but the Manitoulin dolomite member of the Medina formation has been quarried to a considerable extent at Owen Sound. Some of these quarries are now being used as garbage dumps. The stone has been used for road metal, flagstones, coursing and concrete aggregate. The Lockport dolomite has long been used in the manufacture of lime, as were limestone boulders during the settlement period. Brick-making on a small scale has also been indulged in.

As long ago as 1859 the petroliferous Collingwood shales were exploited for their oil content and an extraction plant was erected near Collingwood. The output was small and the plant was abandoned when more abundant and easily recoverable oil deposits were found elsewhere.

Over a period of many years attempts have been made, through drilling, to obtain oil and gas in commercial quantities. All of these attempts in the watershed have met with failure although there have been showings of oil and gas in some of the dry holes. Gas and oil showings are found in the Trenton and Guelph formations.

4. Climate

Putnam and Chapman, in their paper on the climate of Southern Ontario, suggest that the North Grey Region lies within two climatic regions, those of the Western Uplands and the Lake Huron - Georgian Bay.†

The Western Uplands is a large region including most of the Counties of Grey, Bruce, Dufferin, Wellington, Perth and Huron. The elevation of the region extends from about 1,000 feet above sea level to about 1,800 feet above sea level.

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* Smith, W. - Canada - Past, Present and Future. 1852.

† Putnam, D. F. and Chapman, L. J. The Climate of Southern Ontario. Sci. Agric. 18:8, April, 1958.

The following description by Putnam and Chapman gives a rather good picture of general climatic conditions in the upland portion of North Grey Region.

"On the north and east it presents faces of sharp relief, but slopes gradually into the adjoining regions on the south and west. Climatically it is not homogeneous, for at some seasons of the year the outlying portions differ less from the adjoining regions than they do from the central and more elevated parts.

"The mean annual temperature ranges from 41° to 44° and is equivalent to that of the Kawartha Lakes or Eastern Ontario. The winter temperatures of 18° to 21° are, in the main, equivalent to those of the Kawartha region but spring temperatures of 37° to 40° are definitely cooler. Summer temperatures of 64° to 65° are about 1° below those of adjoining areas except in the case of The Lake Huron shore which is cooled by westerly breezes. Fall temperatures vary from 45.5° to 48°. The region has an extreme temperature range of 145°, from -43° to 102°. The mean daily range for the year is 19° to 21° with as much as 26° in July. The frost-free season of 125 to 140 days is much the same as that of Eastern Ontario, being nearly a month shorter than in the milder parts of the adjoining shore regions. The growing season varies from 180 to 195 days, being shortest in the most elevated part of the region.

"The western side of the region has a heavy precipitation, 38 inches annually, decreasing eastwardly to about 32 inches. It is interesting to note that it is not the most elevated area that receives the most rain, but rather, that part having a westerly slope. Snowfall varies from 80 to 125 inches, being heaviest northward. The area of high summer rainfall lies on the southern border of the uplands, receiving from 16 to 18 inches between April 1 and September 30, or about the same as eastern Ontario. Between 8 and 9 inches of rain is received in the months of June, July and August. The uplands are less subject to drought than most of the adjoining areas, having an average frequency of about 18, which, however, is considerably greater than that of eastern Ontario or Muskoka, both of which have about the same amount of precipitation.*

The Lake Huron Georgian Bay climatic region occupies a narrow coastal zone where the lake influence is strong enough to achieve a marked difference in the climate as compared to the uplands. In the watershed it corresponds

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* Frequency of drouths is number of summer months (May - September) having 1.0 inch or less of rain over a 50 year period.

more or less to the zone below the Algonquin shoreline, with some extension up the valleys of the Beaver and Bighead. It includes the whole of the Bruce Peninsula and, along Lake Huron, extends considerably further inland. A description of this climatic region by Putnam and Chapman follows.

"The mean annual temperature of 44° is similar to that of the Lake Ontario shore, as is also the winter temperature of 20° to 23°. The spring temperature of 39° to 41.5° is slightly lower as is also the summer temperature of 64° to 66°. On the other hand, the fall temperature of 49° is about 1° higher. The mean daily range of 15° to 17° is low and is about equivalent to that of the Leamington area. An extreme high temperature of 102° has been recorded at Collingwood but elsewhere there is no record above 100°. The extreme low records range from -27 to -35°. The average date of the last frost in the spring varies from May 7 to 17, and that of the first frost in the fall from October 6 to 13, leaving a frost-free period of 142 to 157 days, or about the equivalent of that of the Lake Erie region. The growing period is between April 16 to 23 and October 30 to November 7, varying from 189 to 200 days at various stations, Collingwood having just as long a season as the southern end of Lake Huron.

"Mean annual precipitation varies from 28.4 inches at Collingwood to 36.4 inches at Owen Sound. Snowfall ranges from 69 inches at Goderich to 125 inches at Owen Sound. From 14 to 16 inches of rain falls between April 1 and October 1, while most of the area receives about 8 inches during June, July and August. Drought frequencies range from 15 to 30 while the index of precipitation effectiveness lies between 10.5 and 13. The west side of the Bruce Peninsula is much drier than the rest of the area and has a climate that in some respects resembles that of Manitoulin.

"It has been previously stated that climatic regions are to a certain extent crop regions, and nowhere is this more plainly shown than in the three just described. The outstanding crop in these areas is the apple, the greater part of the commercial production of the province originating therein.

"The factors which limit the successful culture of apples are early and late frosts, winter temperatures, especially extremes, summer temperatures and precipitation, and the amount of sunshine. The proximity to large water surfaces is the chief cause of the climatic modification which makes these regions outstanding in apple production. The daily range of temperature is kept within narrow limits throughout the year, with a consequent lessening of frost hazard. Spring temperatures are kept low at first, thus retarding the bloom beyond the frost date, and on-shore breezes moderate the summer temperatures, lessening the danger from scald and drought. The slow cooling of the water causes a long open fall

"season, permitting the colouring of the fruit and allowing the tree sufficient time to harden off the new wood in preparation for the winter.

"Protection from wind is also important. This is especially exemplified in the Lake Huron and Georgian Bay region. The Blue Mountain skirts the shore of Georgian Bay, affording protection from gales, and this is one of the reasons why areas such as the Beaver Valley are better suited to apple growing than is the Lake Huron shore."

5. Physiography

The North Grey Region contains a very complex physiography which warrants some mention so that a better understanding of the nature of the watershed may be gained.*

The bedrocks, formed in shallow seas many millions of years ago, have since been subjected to erosion by wind and water. There is strong evidence to suggest that long ago a great river flowed south-east through what are now Georgian Bay, Lake Simcoe and Toronto, carving a large valley through the bedrocks. Tributary streams to this river carved the valleys occupied by the present Bighead and Beaver Rivers, Colpoys Bay and Owen Sound. The whole system has since been filled by glacial debris, or by the waters of the Great Lakes.

Long-continued erosion has also formed the Niagara escarpment, that great topographic break of which the Blue Mountains form a part. This well developed escarpment extends across the whole of the North Grey Region and in a number of places the long steep slopes are used for winter sports. There would seem to be opportunity to extend the recreational values to year round use.

Erosion along the escarpment has formed several mesa-like features, chief of which are Coffin Hill to the

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* For a more complete account of the physiography of the area reference should be made to "The Physiography of Southern Ontario", L. J. Chapman and Dr. F. Putnam, University of Toronto Press, 1951.


NOTTAWASAGA BAY
OWEN SOUND
SYDENHAM
ST. VINCENT
EUPHRASIA
COLLINGWOOD
OSPREY
ARTEMESIA
DERBY
HOLLAND
SULLIVAN
PHYSIOGRAPHY
LEGEND–
TILL PLAIN
DRUMLINS
MUCK & PEAT
TILL MORAINE
KAME MORAINE
BEACH LINES & SHORECLIFFS

north-east of Owen Sound, another south of Delphi point and another south of Colenso. These mesas are capped by erosion-resistant rocks and the thin soils are inferior for agriculture. Much of the mesa south of Delphi point has been reforested as part of the County Forest.

During the past million years Southern Ontario has been covered at least three times by major, continental glaciers. The last of the ice, that of the Wisconsin glaciation, left the North Grey Region perhaps some 10,000 years ago. Each of these major ice advances was marked by many minor, often local, fluctuations in the ice front. Between each of the ice ages there were long periods during which the climate was warmer, at times warmer than now, and the land was ice free.

During their passage these ice sheets acted as eroding agents, plucking, quarrying and grinding the bedrock and surface deposits and mounding and spreading the pulverized material. This unstratified, stony material is known as till and the rock materials comprising it were often carried considerable distances from their point of origin. Succeeding ice sheets, and often fluctuations of the same ice sheet, largely destroyed the work of the one before so that the local topography seen in Southern Ontario today is chiefly the work of the Wisconsin ice and of post-glacial drainage. The land forms resulting from the ice action were of several kinds and most of these may be found in the North Grey Region.

The ice often spread the till beneath it to form an undulating plain of low relief. Such a land form is known as a till plain and it is often drumlinized. The topography is usually mild but restricted soil drainage is often a problem in the hollows. Several areas of till plain may be found in the watershed - e.g., those around Rocklyn and Redwing, in the Beaver Valley above Eugenia, over a substantial portion of the Bighead Valley and in the Heathcote area. The soils are mediu to heavy-textured loams and are fairly productive for the type

of agriculture carried on in the region. The heavy-textured till soils contain, of course, a larger proportion of clay than the medium-textured soils and as a rule these soils are less stony. In a few places, notably near Hoath Head, the till is shallow over the underlying limestone and might, perhaps, be better considered as limestone plain.

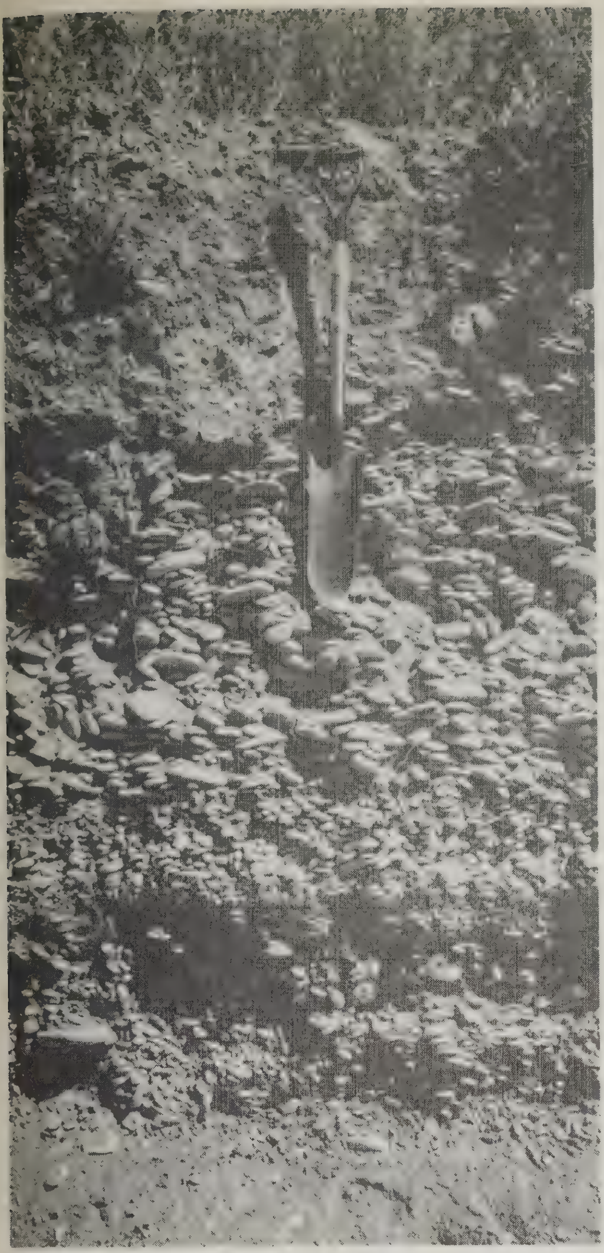
Sometimes the till was moulded under the ice into the form of oval hills known as drumlins. Locally these are often called "whaleback" hills. Over Ontario the dimensions of these hills may vary considerably and those in the Bighead Valley are over 100 feet high in some cases. As in the Bighead drumlin field the drumlins are usually clustered in large groups to form the pleasing and so-called "basket-of-eggs" topography.

These soils are usually loamy, fairly fertile and well drained but steep slopes, the stony nature of the soils, and the poorly-drained inter-drumlin areas often provide difficulties to cultivation. The Bighead drumlins are perhaps steeper than most and require good land use practices so that erosion may be kept at a minimum.

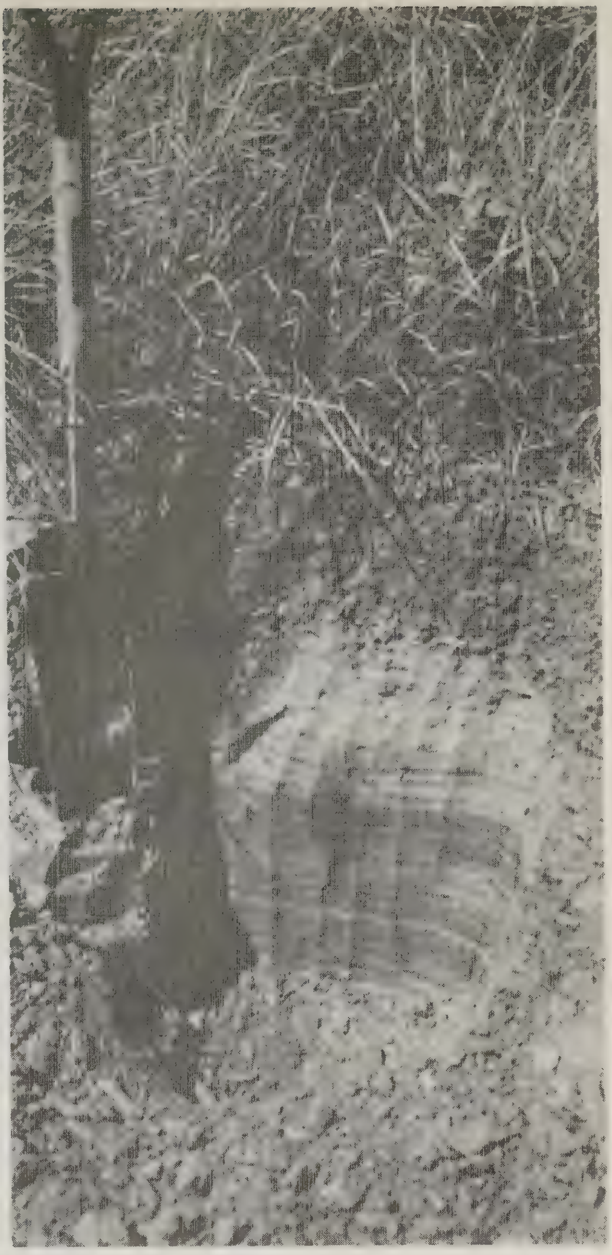
Drumlins are formed under the ice and their long axes correspond to the prevailing direction of ice flow. It is interesting to note that the Bighead drumlins are oriented for the most part in a north-south direction, indicating a north to south ice flow, rather than a flow up the Bighead Valley by a local ice lobe as one might have expected.

Drumlins are also to be found east of Eugenia, east of Heathcote, and near Beaverdale.

During its movement the ice often piled great ridges of till along its border. These ridges are called moraines. The first major recession of the glacier left the upland of Western Ontario free from ice but with subsequent fluctuations there were constructed a number of moraines around it. These moraines have been termed the "horseshoe" system an' the toe of the shoe lies in the north-east part of the watershed. The moraines of the watershed comprising part of



Part of the great barrier beach at Oxmead.



Where lakes once were, varved sediments now often form the parent materials of the soil.

The moraines are often rough and bouldery and provide weedy pasture. They may be better reforested.

the system have been termed the Banks, Singhampton, Gibraltar and Tara, and the Saugeen Kames. The Banks moraine, for instance, runs westward across the watershed from Banks to Kolapore and Duncan. West of the Beaver Valley it runs through Holland and Sullivan Townships.

Most of these moraines are substantial affairs running for tens of miles. West of Owen Sound are several smaller ones named the Tara strands which seem to represent minor halts in the ice front. These strands cut across the drumlins in the area to produce some interesting "boomerang-shaped" features. Much of the limestone bedrock of the region has been covered more or less thinly by coarse, bouldery tills and might in some instances, be thought of as limestone moraine. Because of the general thinness of the cover it has been considered as limestone plain.

These moraines contain stony till and much roughly-sorted outwash. They are often rough and bouldery and may be illsuited to agriculture because of these factors. A considerable acreage is in bush and it is recommended that more be reforested.

In its movement the ice often scraped the bed-rocks clear of soil or left them only thinly covered. These shale or limestone plains in the North Grey Region are usually inferior for agriculture and have an adverse effect on settlement. Where a thin layer of till covers the rock the soil may be moderately good for some agriculture but care needs to be taken that erosion does not become serious or the land may be ruined for further use.

With a warming climate the ice melted and released vast quantities of meltwaters. These waters, of themselves and from the lakes they formed, were important in the creation of landforms of significance. The meltwaters often moved at high speed and were able to carry large amounts of sediment in the form of sand, gravel, clay and silt. The

coarser components were often dumped along the edge of the ice into rough hills of stratified (layered) sand and gravel. The land form resulting is called kame moraine and many examples may be found in the watershed mixed in with the till moraine. Such land is usually rough, droughty and lacking in fertility and is not, consequently, highly valued for agriculture. It may, however, provide valuable supplies of sand and gravel for road metal and building materials.

As the ice melt proceeded the waters collected to form rivers which carved valleys (spillways). These spillways are sometimes well-defined channels floored by gravels. They may be empty or may be occupied by streams too small to have cut them. The present Beaver River upstream from Eugenia occupies a spillway,

With the retreat of the ice from Ontario came the formation of the great pro-glacial lakes. One of these, Lake Algonquin, together with its successor Lake Nipissing, occupied the depressions of Lakes Superior, Michigan, Huron and Georgian Bay, but the waters were much deeper and covered a far larger area.

In the North Grey Region former lake waters extended inland from the present shore a considerable distance. There were thus substantial embayments in the Bighead and Beaver Valleys as evidenced by silt deposits near Elmhedge and beach development near Kimberly at an elevation of some 800 feet. Other features constructed by the lake waters include boulder pavements at the foot of shorecliffs, wave-built strand lines, sand plains, clay plains, barrier beaches (the Oxmead beach is the most notable) and the substantial shorecliffs themselves. In the western part of the watershed the complex physiography has been emphasized by lacustrine sediments.

While the broad picture of the watershed was formed in glacial and pre-glacial times some developments have taken place since the last ice retreated. These developments

include the formation of the present Georgian Bay shorecliff, the deepening of the river valleys, the creation of muck and peat bogs and the development of soil from the parent materials laid down before and during the ice ages.

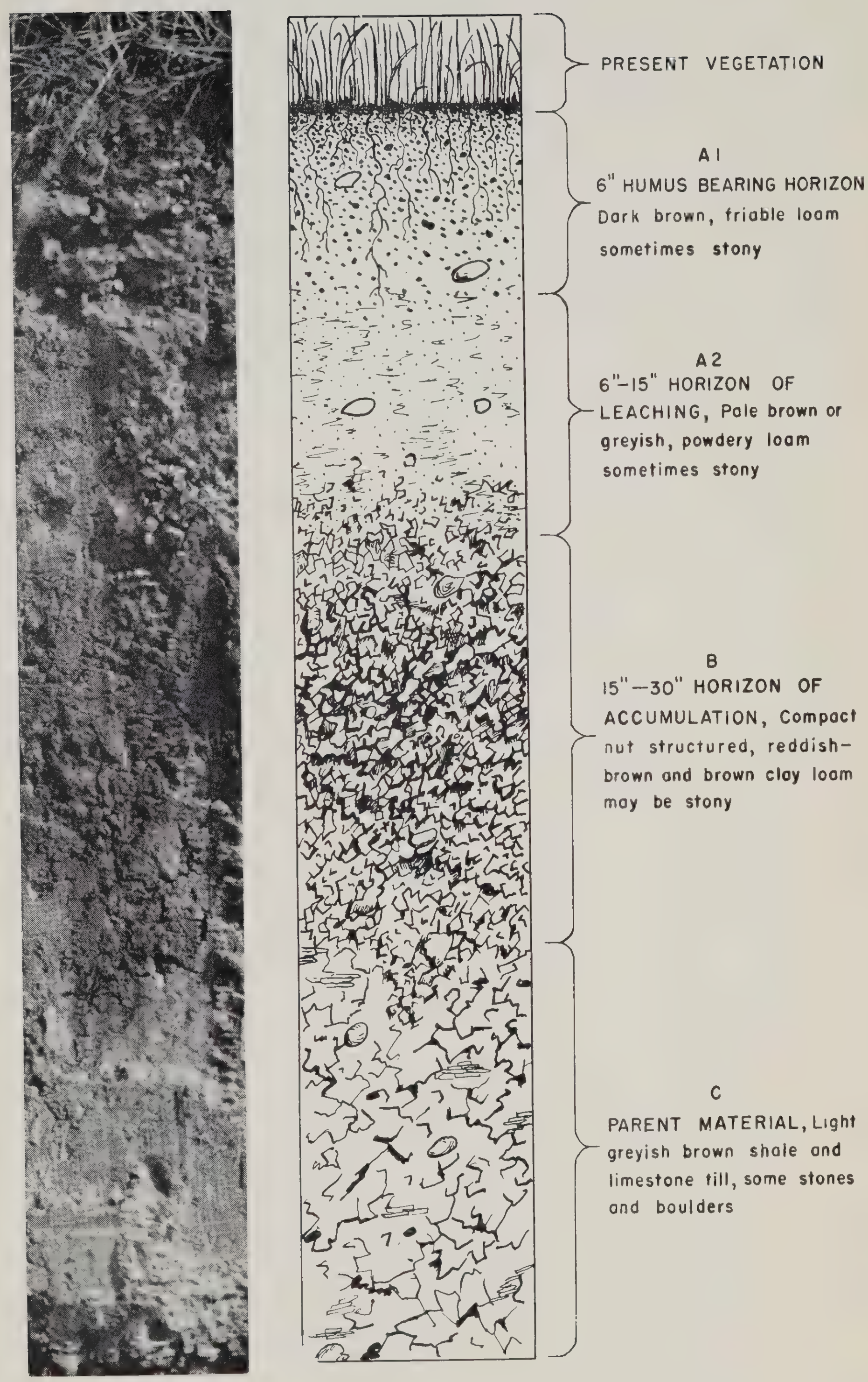
6. Soil

(a) The Soil Profile

Although soil may be described loosely as being the medium in which plants grow, even general observation reveals the fact that there is considerable variation in the soil and in its ability to support crops. Not only is there variety in the materials making up the soil but different soils of different capability may develop on much the same type of material.

As described here the soil is a reflection of the environment in which it developed. As a result, the development of any particular soil is a matter which involves a number of factors, some one, or group of which may be of more importance than the others. Type and composition of the parent material, surface slope, soil drainage, climate and vegetation are some of these factors. In any single instance they operate together in such a way that, given time, they produce a soil possessing certain recognizable characteristics. The soil will not change materially so long as the environment under which it was produced remains stable.

If a vertical cut is made through most Ontario soils to a depth of three or four feet it will be seen that the cross-section is marked by a layering, each layer, or HORIZON, possessing certain characteristics of colour, texture, structure, organic content, acid reaction and so on. Together these horizons make up the soil PROFILE. The depth of the profile is variable, in some soils a foot less and in others several or many feet. Most of the well-drained soils of the watershed have fairly well developed profiles but we have seen that in



Profile of a representative gray-brown podzolic soil.

some cases, particularly on the limestone plain, there may be little or no soil cover let alone profile development. Profile development is also weak or non-existent on the flood plains of the streams because of periodic inundation.

Throughout Ontario several distinct kinds of profile may be found and each is representative of a great soil group. The well-drained Gray Brown Podzolic soil, of which a generalized profile description follows, is common in Southern Ontario and is represented on the watershed.

HORIZON

A_0 - Partially decomposed litter from deciduous trees.

A_1 - Dark grayish-brown to very dark brown mineralized humus layer - loose and friable and slightly acid in reaction.

A_2 - The leached horizon, yellowish to yellowish-brown to gray in colour. The iron, lime, organic matter and clay have been washed out and the reaction is acid.

B - The horizon of accumulation, containing a high proportion of clay and sesqui-oxides. Usually the colour is dark or reddish-brown while the structure is blocky or nutlike. In reaction it is usually neutral to slightly acid but the lower portion of the horizon may contain some free carbonates.

C - The unweathered, calcareous parent material, usually gray or brownish-gray in colour.

In no case are the horizons separated one from the other by a sharp break; there is always a transition, in some cases greater than in others.

Profile complexity also varies. In some soils not all horizons are represented, or they may be poorly developed. Also, the horizons may vary considerably from soil to soil in thickness; some have a thin A_2, some have a thick A_2, and so on.

When speaking of the soil horizons the A is considered to be the topsoil, the B the subsoil and the C the parent material. In a poorly drained soil the A_2 and B horizons may be missing and a G (glei) horizon exhibited, hence the name Dark Gray Gleizolic applied to soils of this kind. The inferior soil drainage is reflected in the dark colour of the soil and the blue or bluey-gray colour and rusty mottling of the glei horizon.

As plant material decays it is gradually incorporated into the A horizon as humus by the action of earthworms, micro-organisms and so on. During this process certain acids are formed and these are washed downwards by the rain. Partly as a result of this acidic solution, lime, iron, clay colloids, and organic matter are leached out and carried downward to be redeposited, in part, in the B horizon. The B horizon thus has a rather high clay content and is dark-brown to reddish-brown in colour. Depending on their thickness several horizons may be mixed together when cultivated to form an A_c (cultivated) horizon.

Under conditions of a fluctuating water-table near the surface a soil may be considered to be imperfectly drained. Such a soil may possess a thicker A_1 horizon and at the same time the A_2 or leached horizon may be less well developed. Field identification is guided by mottling (rusty streaks and patches) appearing in the lower part of A_2, and in the B horizons.

As well as the Gray Brown Podsolic soils, there are also those belonging to the Brown Forest group. These soils develop over highly calcareous parent materials, tend to be shallow, and lack the leached A_2 horizon common in the Gray Brown Podzolics. The A and B horizons are normally much more alkaline. Soils transitional in development between the Brown Forest and Gray Brown Podzolic are considered as intergrades and exhibit some of the characteristics of both.

In addition, there are on the watershed several other kinds of soil which reflect local environmental conditions. In the case of organic soils (muck and peat) the drainage has been so poor for so long that normal profile development has been unable to take place. The poor drainage conditions have prevented the complete decomposition of the plant residues with the result that they have accumulated over the years. The persistence of water inhibits the activity of aerobic bacteria, earthworms and fungi.

Most of the organic soil deposits are found above the Niagara escarpment and there seems little doubt that they help to sustain the regular flow of the streams rising in this region. The deposits are fairly extensive but the materials are often shallow. Most of the peats are derived from a forest cover and are consequently woody. Except for small areas in existing fields the organic soils of the watershed have remained unused for agricultural purposes. There is little need to clear them for agriculture and it would be highly desirable to keep these areas in forest, and improve their wildlife resources where possible.

Bottomland, a land type consisting of soils made up of alluvium, is found along stream courses where periodic inundation takes place. This flooding leads to the deposition of various mixtures of sand, silt, clay and gravel. Soil drainage is usually imperfect to poor and soil profile development is most often non-existent. For the most part these lands are so limited in extent or are so awkwardly situated that it is not normally feasible to use them for crop production and they are either left in forest or have been cleared and used for rough pasture. Soil fertility is variable but is usually fairly good.

(b) <u>Soil Erosion</u>

Many people are possessed of the misconception that erosion of the land, that is, the translocation of soil

materials from place to place by the natural forces of wind or water, can be stopped completely. This is impossible, except perhaps, over small areas, for relatively short periods of time, and under certain conditions. Through the ages erosion of the land has taken place, moulding it into the scenery we see today. Under natural conditions this erosion is a very slow process and long years are required to alter the landscape appreciably. We call this form of erosion "geologic" erosion.

Under natural conditions the face of the earth is masked by a cover of vegetation and it is this cover which is chiefly instrumental in retarding run-off and slowing down erosion by wind and water. Because of the slow rate of erosion the soil, as seen in the profile, is not greatly affected by it and the process of soil building is easily able to keep pace with the erosion. While conditions remain more or less the same the loss of a fragment of surface soil is offset by an increment from below as the parent material weathers and is incorporated into the soil. Under conditions such as this nature is, by and large, in balance.

When the land is cleared for cultivation or used for grazing, however, this picture may be greatly changed: the protecting cover of vegetation is removed or reduced; cultivation may be carried on up and down the slope and surface water enabled to flow over the land more easily; the structure of the soil changed for the worse and organic content lessened with the result that the soil's moisture absorptive capacity is impaired. All of these changes can easily produce, in a rather short time, a less productive or even a ruined soil.

Such erosion is called induced or "accelerated" erosion. It is this erosion that the conservationist is concerned about and which every farmer should be aware of.

Some soils erode more readily than others and the same soils under different forms of land use may show vastly different amounts of erosion. Every drop of rain moves

a little bit of soil and the amount of soil detached depends on the force of the rain, the nature of the soil and the type of cover. There are also other factors which affect the rate of erosion: surface slope, topography, intensity of land use, rate of rainfall and the physical condition of the soil. For these and other reasons a farm plan based on conditions peculiar to the individual farm is desirable to control erosion.

In Ontario the removal of soil by erosion is accomplished by wind and water; the former is of importance in only a few areas, chiefly those of light soils. Erosion by water is much more widespread although, as intimated, it is more damaging on some soils than on others. Gently sloping land can sometimes be damaged severely.

When the surface run-off is concentrated into channels which are unprotected, or inadequately protected, gullies may develop. This is the most spectacular form of erosion in Ontario and a gully can grow quickly to the detriment of the land and the farmer. Fortunately, this form of erosion is not common on the present watershed but some gullies are found cutting back through streambanks and in some of the areas of heavier soils. Run-off channelled in an unprotected field, unprotected tile drain outlets, and channels formed through cattle always using the same path are among the contributing factors leading to gully erosion.

At the start a gully may be insignificant but it can become large very rapidly. Small rills which are found on the slope of a cultivated field after a heavy rain and which can be covered over at the first cultivation are danger signals every farmer should heed.

Sheet erosion is much less spectacular but is dangerous because it is so widespread and most often goes unnoticed. This form of erosion usually takes place relatively slowly, but a whole field may be affected, with the result that the humus-rich portion of the soil, together with its store of

available nutrients, is removed. Much of this erosion takes place during summer storms, just at a time when crops need the moisture which is flowing over the surface of the land into the streams. A reduction in the run-off would thus prove directly useful in at least two ways: reduced erosion and increased moisture supply for crops.

Many measures may be adopted to control run-off and reduce erosion. Land kept under a permanent cover of grass or trees and properly managed may erode very little. The same may be true on level lands regardless of the form of use, although, of course, the land may become less productive unless soil management practices are adequate. Soil-building rotations, the use of cover crops and fertilizers, contour tillage and grassed waterways are among the measures that may be used.

The following figures suggest the influences that various land conditions and land uses have on soil erosion. These figures have been taken from a bulletin (No. 492, September, 1952) of the Ontario Department of Agriculture, to which further reference may be made.

THE EFFECT OF RAINFALL INTENSITY ON SOIL EROSION

(Corn planted up and down a 10 per cent slope
Central Experimental Farm, Ottawa)

Rainfall (inches)	Duration of Rainfall	Soil Losses in tons/acre
2.90	60 minutes	53.5
0.50	10 "	6.5
1.98	38 hours, each 30 minutes	18.2
1.29	24 hours	1.4

THE EFFECT OF SLOPE ON SOIL EROSION

(for 4 months, June - October; rainfall 14.9 inches
Central Experimental Farm, Ottawa)

	Soil Losses in tons/acre
Corn up and down a 10 per cent slope	77.5
" " " " " 5 " " "	45.2
Corn on the contour on a 10 per cent slope	28.8

THE EFFECT OF LAND USE ON SOIL EROSION

(Average of 5 years; on a 10 per cent slope; up and down cultivation for May-October; average rainfall 20.1 inches; from a clay soil; Central Experimental Farm, Ottawa)

Crop	Soil Losses in tons/acre
Summer fallow	26.5
Corn	27.3
Oats	.7
Alfalfa	.1

THE EFFECT OF CROP SEQUENCE ON SOIL EROSION

(Slope 16 per cent, silt loam soil; average annual precipitation 31.7 inches - 1932 - 1940-Bulletin 452, La Crosse, Wisconsin)

Crop Sequence	Soil Losses in tons per acre per year
Corn continuous	89
Corn after Soybeans	66
Corn after one year of hay	42
Corn after six years of hay	28
Barley after corn after one year hay	24
Barley after corn after six years hay	10
First year hay	0.75
Bluegrass sod	0.20

The results tabulated in the above tables indicate that "clean" land and land in row crops (corn etc.) erodes much more readily and to a greater extent than does the same land under grain and grass crops. It is also generally true that erosion of consequence is much more likely where row crops (or even grain crops) form the sole or major element in the rotation. It is advisable to maintain row crops on the low-slope fields and to incorporate them in soil building rotations.

Generally speaking erosion due to row crop production is a minor problem in the Bighead Watershed, most of the open land being devoted to hay, pasture and grain. As the agricultural importance of the area grows and as the emphasis on land use changes (both are quite liable to happen in a few years as our population increases) row crop production may

become more important and also the erosion problem unless definite attempts are made to relate land use to land capability.

(c) <u>The Estimation of Erosion</u>

There are a number of ways of determining whether erosion has taken place and the amount. The effect of erosion may often be easily seen in poor crop response due to drought. On slopes or knolls where the A and/or B horizons have been removed, the soil is less able to absorb moisture, and the crop may be thin and weak. Where erosion has been severe, the grayish parent material may be seen at the surface. A patch with an excessively stony surface may also be a sign of severe erosion and reflect the removal of the finer soil constituents. Erosion of this severity is relatively rare on the watershed.

Where observations such as this may be made, other evidence is also usually available: sediment may be seen to have accumulated at the bottom of a slope; soil may accumulate on the uphill side of a fencerow, while the downhill side is cut away (this is not uncommon).

To get a more certain determination of the degree of erosion the soil profile must be examined. It is usually possible to find a good profile of a virgin or nearly undisturbed soil in woodlots and along old fencerows. Such a profile may (if of the gray brown Podzolic type) for instance, exhibit one foot of topsoil (A_1 and A_2) and two feet of subsoil (B). On an adjacent cultivated slope of the same soil type and on which erosion is suspected, there may be only 6 inches of topsoil over the subsoil. In such a case it would be fair to assume that something like 6 inches of topsoil had been eroded away. In another case one might find the sub-soil exposed at the surface and the parent material at a depth of only 12 inches. All of the topsoil and one half of the subsoil, something like 2 feet of material, would thus have been removed.

If the recognition of horizons by colour or texture is difficult, a simple chemical test can be used to aid in erosion estimation. A dilute solution of hydrochloric acid produces an effervescense when applied to soil containing free carbonates. In the imaginary virgin profile mentioned above a fizz would be obtained at 3 feet at the start of the lime-rich parent material. On the severely-eroded site the same result would be obtained at 1 foot. If the surface soil effervesced it would indicate that all of the topsoil and subsoil had been removed.

The estimation of erosion in the Brown Forest and Brown Forest - Gray Brown Podzolic Intergrades is rendered somewhat more difficult because of the less well-developed profile, the absence of the A2 horizon, and the greater abundance of free carbonates in the profile.

CHAPTER 2

THE BIGHEAD VALLEY

1. General Remarks

Because of its large size it was not possible to investigate fully the physical land conditions of the North Grey Region in the time available. It was therefore decided to concentrate on one area of the Region only - that of the Bighead River Valley. This valley was considered to be of a reasonable size to permit adequate preliminary study and to possess certain other advantages as well. The County Agricultural Representative concurred in this selection.

The Bighead Valley occupies a position midway between the eastern and western extremities of the Region and covers an area of some 85,000 acres. The watershed, squarish in shape, has a northeast-southwest dimension of approximately 18 miles and a northwest-southeast dimension of approximately 15 miles. The river empties into Georgian Bay at Meaford and information as to stream gradients, stream flows, flood flows and flood problems may be found in the companion report on Water.

The whole central portion of the watershed is a highly drumlinized till plain with many interdrumlin swamps. Rather fortunately, the survey grid is oriented closely with the long axes of the drumlins and this is a decided asset in facilitating contour cultivation of the fairly steep drumlin slopes. This fact, together with a high proportion of grass and grain, has undoubtedly served to keep sheet erosion on these slopes at a moderate level although many of the steeper ones exhibit more severe wash.

The southern portion of the watershed is largely till and kame moraine with some limestone plain

and some till plain. The topography is on the whole fairly rough and the soils tend to be droughty, deficient in fertility, and at times quite stony. Forest and pasture occupy a fairly high proportion of the area and erosion problems tend to be minor on these lands. Where these rough lands are cultivated or pastured to excess, wash becomes a problem of larger proportions. Areas of poor drainage are quite common. In this section is found most of the land in the Bighead Valley recommended for acquisition by the Authority for Authority Forest.

Along the north-western edge of the valley is found an area of limestone plain, limestone cliffs and some swampland, part of which has already been acquired by the Authority as a Conservation Area. This whole area is generally deficient for productive agriculture of any kind and a large portion is recommended for acquisition by the Authority Forest. The soils are generally thin over limestone, and are often stony. The small amount of cultivation has resulted in erosion of only a minor nature.

Although most of the stream courses carry water throughout the year, some of it satisfactory for the production of game fish, a few do become dry or dry to standing pools. This undoubtedly creates a few stock-watering problems for some farmers but by and large the problem is minor. The lack of a conflict with irrigation agriculture more common to other areas of Ontario is undoubtedly a favourable factor. The present and future possibilities of the river in terms of fish production are fully discussed in the companion report on Fish and Wildlife and the reader is referred to that report for pertinent maps and data.

2. Bighead Valley Soils

As might be expected in an area as physically complex as the Bighead Valley, there are a considerable number of soil types of varying capabilities. These soils

have been mapped on a reconnaissance basis by the Ontario Soil Survey, and together with soil descriptions, the results have been published in the Soil Report of Grey County.* While a brief summary of some of these soil types is included here the reader is referred to the above report for fuller details.

The soils of the valley may be grouped according to the type and origin of the parent material. It is thus possible to distinguish those which have developed on the rough and open tills of the moraines, the medium and fine-textured and agriculturally better tills of the drumlins and till plain, the gravelly outwash of the kame moraines, the sands of the sand plains, and so on.

The same type of soil development (though not the same soil types, of course) may take place in a number of parent materials. It is thus possible to find Gray Brown Podzolic soils on all of the above-mentioned parent materials. These soils would all have similar profile characteristics. The same is true of Dark Gray Gleizolic soils and Brown Forest soils. These soils, together with the intergrades, have already been described or discussed to some extent.

Where a group of soils has developed on the same type of parent material and possesses similar horizon development and characteristics, it is classed as a soil series. Type differentiation within a series is based on the texture of the surface soil. There is thus a Harkaway loam and a Harkaway silt loam. The name Harkaway indicates the soil series and, with the exception of the texture of the surface soil, these two soil types have mostly the same differentiating characteristics.

Where soils have developed on similar parent

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* Soil Survey of Grey County, Report No. 17 of the Ontario Soil Survey. Experimental Farms Service, Canada, Department of Agriculture and the Ontario Agricultural College.

materials but differ in profile characteristics due to drainage or relief, their classification may be done on the basis of the catena. In terms of drainage there may thus be three series in the catena; the well-drained, the imperfectly-drained and the poorly drained. In the Harkaway catena the Harkaway series is the well-drained member, the Wiarton series the imperfectly-drained member, and the Parkhill series the poorly-drained member. All of these catenary members are found on the watershed. For convenience a catena is usually identified by the name of the well-drained member. The soil types may also be further sub-divided as to phase. Thus, the Harkaway may have a shallow phase over bedrock or a stony phase, or even an eroded phase if this was considered important enough to map.

The largest single acreage of soils is occupied by those of the Vincent catena, followed by the Osprey and Harkaway catenas. The balance of the watershed is occupied by a group of soils and land types including the Fox, Dunedin, Pike Lake, Muck, Breypen, Bottomland and others.

The soils of the Vincent catena have developed on a fine-textured (clay) grayish-brown till which tends to be hard in the subsoil and which, although containing stones, are not unduly difficult to work because of this factor. In many ways these soils resemble those of the Huron catena which are found in Huron and contiguous counties. The Vincent, Kemble and Brookston soils comprise the series of the catena.

Topographically the slopes range from gentle to steep and erosion may consequently be a problem where improper land use practices are followed with frequency. The drumlinized or fluted nature of much of the terrain lends itself to the adoption of such conservation measures as contour cultivation and contour strip cropping.

The inherent fertility of the Vincent and Kemble soils is fairly good and they are able to support a

highly successful general agriculture based on beef and dairy production. In the Beaver Valley to the east a moderate acreage of Vincent soil is devoted to commercial apple production. Productivity of the imperfectly-drained Kemble Silty Clay loam may be improved through the adoption of adequate tile drainage. Satisfactory results may also be achieved in some cases through adequate drainage of the poorly-drained Brookston Clay loam.

The following generalized profile descriptions, taken from the Grey County Soils Report mentioned earlier, indicate some of the physical characteristics for these three soils. The pH is an index of acidity, the numbers lower than 7.0 (neutral) suggesting greater acidity than those above.

(a) Vincent Silty Clay Loam (Brown Forest-Gray Brown Podzolic Intergrades) - cultivated.

A_1 - 0-4 inches, clay loam; very dark grayish brown; medium granular structure; friable; a few small stones; pH - 7.0

B_1 - 4-10 inches; clay loam; yellowish-brown; fine to medium nuciform structure; firm consistency; very few stones; pH - 6.8.

B_2 - 10-24 inches; clay; brown; medium blocky; hard consistency; plastic when wet; very few stones; pH - 7.2.

C - Light brown; clay till, stony; pH - 8.0.

(b) Kemble Silty Clay Loam (Brown Forest) - cultivated.

Ac - 0-6 inches; silty clay loam; very dark gray-brown; small to medium nuciform; very friable; pH - 7.2.

B - 6-12 inches; clay; brown; medium nuciform structure; hard; plastic when wet, mottled; pH - 7.3.

C - Silty clay loam; light brown; fragmental structure; extremely hard; plastic when wet; pH - 7.8.

(c) Brookston Clay Loam (Dark Gray Gleizolic)

Ac - 0-7 inches; clay loam; very dark gray; granular structure, friable; pH - 7.2.

Bg - 7-24 inches; clay; grayish-brown; mottled; massive structure; hard; plastic when wet; pH - 7.1.

C - Clay; pale brown; gritty calcareous; till pH - 7.6.

The Harriston and Harkaway soils are similar in several respects; both have developed in medium-textured till materials on a drumlinized till plain and both are much alike in their capabilities although the inherent fertility of the Harkaway does tend to be a little lower. As far as management is concerned both would be treated much the same. In one respect the Harkaway is often inferior in that it is often noticeably stonier or more bouldery.

Both soils are productive for the general farming which is common and are fairly easy to work, but the steep slopes associated with many of the dumlins may suffer from erosion if not well managed. Many of these slopes lend themselves to easy contour cultivation and strip-cropping but the steep ones should be left in permanent grass or reforested. Both soils contain loam and silt loam members and the latter is usually less stony, more fertile, and easier to work.

The Listowel and Wiarton soils are the imperfectly-drained associates of the Harriston and Harkaway soils respectively. Soils of these types are limited in the watershed but beyond its boundaries the acreage is extensive. In both types the topography is gentle and erosion is usually of small consequence. Both soils suffer from restricted drainage and productivity is undoubtedly reduced because of it. Adequate tile drainage should prove beneficial on both types. It may be that the new and cheap plastic liner "tile" under development will prove satisfactory in soils of this type.

The poorly-drained Parkhill soil has both loam and silt loam types and is mapped common to both the Harriston and Harkaway catenas. It is, of course, a soil of the Dark Gray Gleizolic Group, and occupies depressional areas which are normally bush-covered and carrying cedar, elm, soft maple and other species common to such areas. Although artificial drainage may be worth while in some places it is believed the interests of all concerned would be better served by retaining these lands in productive and unpastured forest.

The morainic soils are represented by those of the Osprey catena which have developed on coarse, open tills, and by the Pike Lake, Waterloo and Donnybrook catenas which have developed on coarse sands and gravels of the kame moraine. In each case the topography is jumbled and may be rough to extremes, the natural fertility level is low and soil drouth may be a significant limiting factor in crop production. On the Osprey and Pike Lake series particularly boulders and stones may be a definite cultivation hazard. Soil erosion of moderate to severe proportions may result under improper land management. It would undoubtedly be much worse than it is were it not for the extensive forest and grass cover. The Donnybrook and Waterloo soils in particular are often important sources of sand and gravel. The Osprey soils are often difficult to map because of the frequent occurrences of small amounts of outwash material.

The sandy outwash or deltaic soils are mapped mainly as belonging to the Brighton catena. These coarse, calcareous sands have been well sorted and are usually level to gently rolling topographically. In some cases the Brighton has a gravel sub-layer. The largest acreage of this soil on the watershed is found near the river mouth. The total acreage is small, however, compared to the total for the type as found in the Meaford and Thornbury districts. In both localities, particularly the Thornbury, the soil is greatly

used for commercial apple orchards. The profile is usually fairly well developed and may vary considerably in depth. Although the topography is very gentle some care needs to be taken to prevent the possibility of wind erosion. Minor acreages of this soil are found elsewhere up the valley but are not devoted to any special use.

The imperfectly drained associate of the Brighton, the Tecumseth sandy loam, is also a level, low-fertility, high lime soil. This soil is used largely for general farming and very little for orchard production. With satisfactory drainage installed there seems little reason for this soil not to produce well. Both soils should be fertilized as needed and, perhaps, irrigated to produce the best of crops.

The final catenary soil to be discussed is the Dunedin Clay, a nearly residual soil developed on the red shales of the Queenston formation. At its best this soil is moderate in depth and is easily recognized by its pronounced red colour. It is a moderately fertile soil but the fine texture may, at times, make cultivation a trying business. Preservation or improvement of the structure may be accomplished by the incorporation of organic matter. The soil tends to erode badly, particularly on the steeper slopes, and may be difficult to deal with if the erosion has gone very far. Most of the Dunedin Clay is found along the eastern border of the watershed and in some sections the erosion problem has become serious.

The mucks are the result of poor drainage conditions operating over a long period of time. These conditions have prevented the complete decomposition of the organic debris, with the result that it has accumulated over the years. The muck is quite dark in colour, may be alkaline or acid, depending on the nature of the waters draining into it, and may be several feet thick. The underlying mineral

material is variable but sand and clay are common. Sometimes the bed is marl and sometimes limestone. The cover is normally woodlot or scrub.

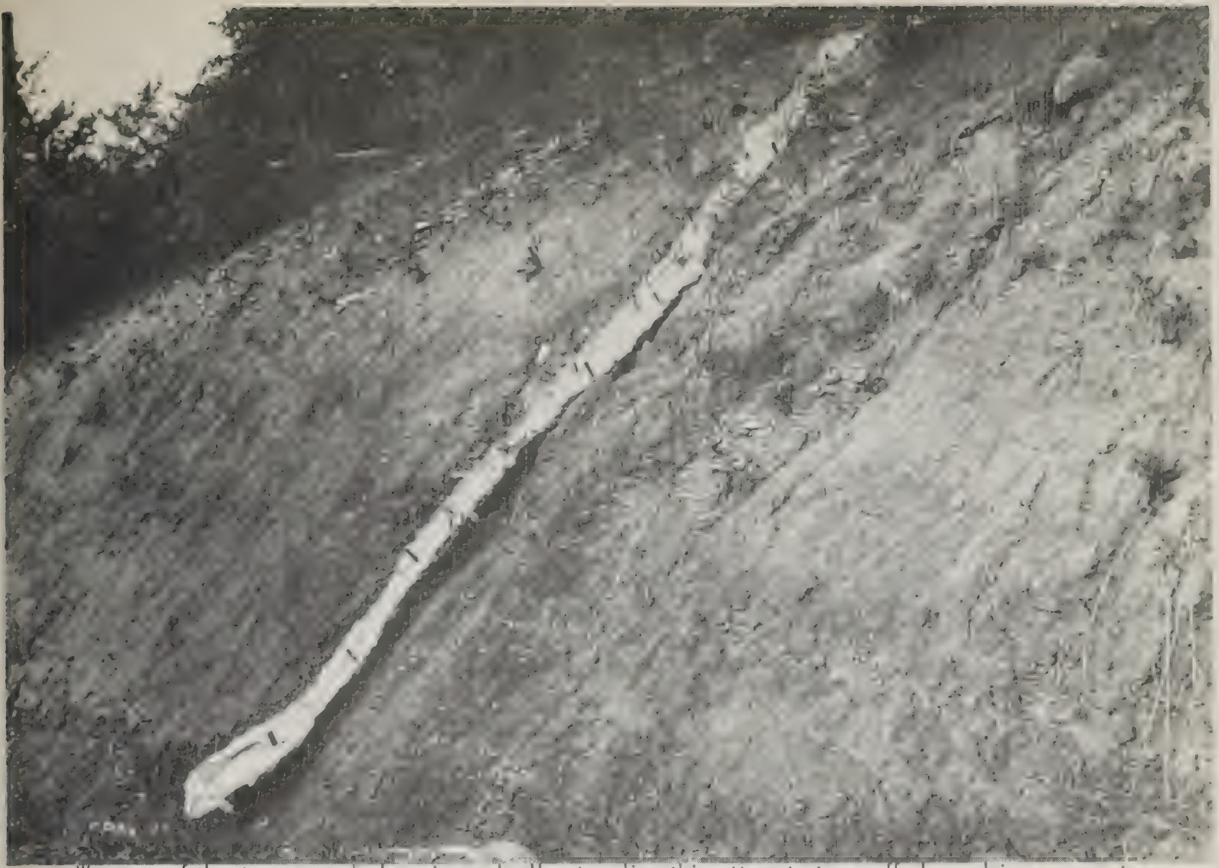
Bottomland, a land type consisting of soils made up mainly of alluvium, has been discussed to some extent previously. It should be noted that, depending on the width of the section in question, it was sometimes found necessary to include, for mapping purposes, the adjacent valley slopes. This was made necessary by the scale of mapping and has some bearing on the recommendations found on the map accompanying this report.

The last soils requiring mention are the Breypen and Farmington, both of which, for our purposes, may be considered as land types rather than soil types. In both cases the soil material is shallow over limestone bedrock and is generally ill-suited to worthwhile cultivation. The Breypen particularly produces very limited cultivable land and pasture of indifferent quality. Much of it has been recommended for reforestation but the many rock knobs will make this difficult to accomplish easily and quickly. The bedrock of the Farmington is much less knobby and soil of sufficient depth for cultivation is more frequently found.

3. Bighead Land Conditions

The following tables have been compiled from data collected by the survey crews during the inventory of the land conditions of the Bighead Valley. If read in conjunction with what has been said previously these figures should be pretty much self-explanatory.

As far as erosion is concerned it will be seen that most of the land is little affected. There is, nevertheless, a substantial acreage suffering from a degree of erosion which should give concern. In all, over 16 per cent of the land is affected by moderate to severe erosion. A substantial portion of this is found on the steep slopes of



Wastage of the unprotected slope is gradually stranding this attempt at run-off channel improvement. Similar erosion takes place on cultivated land.

Poorly constructed road ditches harbour weeds, contribute silt to streams and cost money to maintain.

Erosion of this nature is a common and serious problem in some areas and should be dealt with soon.

drumlins and on the steeply-hummocky moraine. As the Authority carries out its program of forest land acquisition and reforestation some of this problem will be dealt with on a permanent basis. There will still remain, however, private lands requiring treatment. Of necessity this must remain an individual farm problem but the Authority should take an interest in promoting those practices which will prevent and cure this problem as far as is possible. These figures do not take cognizance of stream bank erosion or of roadside ditch erosion. Both are often, perhaps usually, beyond the immediate control of the individual farmer.

Besides being a straight physical problem erosion has a monetary value of consequence. Elsewhere in this report, and in the companion report on Water, some of these consequences are discussed in more detail. Suffice it to say that erosion costs the taxpayer at large substantial amounts each year in harbour dredging and in road ditch repairs and the farmer also in silted ditches and ponds, in polluted streams, in damage to crops through silting and in damage to crops through lowered yield.

Soil drainage is also a matter deserving attention. The figures in Table 4 indicate that 15 per cent of the lands of the Bighead Valley are suffering from drainage imperfections, and of which some may be dealt with to advantage. The item classed as "variable" in the table, and comprising nearly 8,000 acres, consists of lands such as the Breypen where soil drainage may change too quickly or be spotty to the extent that mapping it is difficult.

BIGHEAD - NORTH GREY

TABLE 1

EROSION GROUPS

Group	Acres	Per Cent
0	9,513	11.2
1	48,302	57.2
2	11,723	13.8
3	1,872	2.2
4	460	.5
5	59	.1
	71,929	85.0
Muck	5,282	6.2
Bottomland	4,566	5.3
Breypen	2,853	3.4
Miscellaneous	59	.1
	12,760*	15.0
TOTAL	84,689	100.0

0 - no apparent erosion

1 - less than 1/3 topsoil removed

2 - 1/3 to 2/3 topsoil removed

3 - 2/3 + topsoil and less than 1/3 subsoil

4 - all topsoil and 1/3 - 2/3 subsoil

5 - erosion into parent material

* No attempt was made to estimate erosion on this acreage. Much of it is in woodland and suffers little or no erosion.

BIGHEAD - NORTH GREY

TABLE 2

SLOPE GROUPS

Group	Acres	Per Cent
A	11,651	13.6
B	12,158	14.3
C	10,405	12.3
D	4,437	5.5
E	2,160	2.5
F	656	.7
G	930	1.1
	42,397	50.0
M	21,686	25.6
N	5,266	6.3
P	1,549	1.8
R	1,031	1.2
	29,532	34.9
Miscellaneous	59	.1
Muck	5,282	6.2
Bottomland	4,566	5.4
Breypen	2,853	3.3
	12,760*	15.1
TOTAL	84,689	

Smooth Slopes

A 0-2 per cent
B 2-7 " "
C 7-10 " "
D 10-15 " "
E 15-20 " "
F 20-30 " "
G 30 per cent +

Hummocky Slopes

M 0-7 per cent
N 7-15 " "
P 15-25 " "
R 25 " " +

* No attempt was made to ascertain the slope conditions of these four land types.

TABLE 3

SOIL TEXTURE

Type	Acres	Per Cent
Fine (Clay Till, Clay, Silt)	28,934	34.2
Medium (Till)	19,931	23.6
Coarse (Till, Sand, Gravel)	22,605	26.7
Organic (Muck and Peat)	5,282	6.2
Variable (Rock Plain, etc.)	7,937	9.3
TOTALS	84,689	100.0

Bouldery soil - 1,342 acres

TABLE 4

SOIL DRAINAGE

Class	Acres	Per Cent
Well Drained	63,200	74.7
Imperfectly Drained	5,749	6.8
Poorly Drained	2,545	3.0
Very poorly Drained	5,282	6.2
Variable	7,913	9.3
TOTALS	84,689	100.0

CHAPTER 3

PRESENT LAND USE

1. Introduction

Compared to some sections of Southern Ontario, the North Grey Region was relatively late in being opened to settlement and in being settled. These events had, perforce, to await the demand for these lands and routes into these lands. Surveys of Collingwood and St. Vincent Townships took place in 1833 and settlement commenced almost immediately. Surveys of the other townships took place at later dates, many in the 1840's.

Once begun, settlement of the lands, and consequent land clearing, took place very rapidly. In the space of a decade or less after the initial settlement there was an astonishing variety and volume of farm produce coming from the new townships. By 1851 St. Vincent and some of the other townships were producing, in various quantities and with varying degrees of success, tobacco, hops, wheat, oats, turnips, wool, butter and other goods.

2. Fruit Growing

The spectacular growth of the country and of agriculture may also be seen in the rapid rise in fruit growing. "During the 1860's it (fruit growing) steadily increased in importance, owing to the failure of the wheat crop, the expansion of urban centres, the construction of railroads, and the general rise in living standards."*

By 1881 it was noted that "Fruit growing is extensively carried on, along the shores of Georgian Bay. Peaches, pears and grapes do well, but plums are grown in very large quantities, and they are famed for quality and flavour. Large quantities of winter apples are shipped yearly - at least

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* Jones, R. L. History of Agriculture in Ontario, 1613-1880. University of Toronto Press. 1946.

one half of the quantity grown is thus disposed of. The price fetched is from $1.50 to $1.75 per barrel. Apple and plum orchards are becoming increased every year, and there is every prospect of the shore townships of Grey becoming a great fruit growing region."*

In the same report it was also noted that "Above all other portions of the Province, the Owen Sound district excels in the cultivation of the plum. The soil is a clay loam, resting on limestone rock. The rot is the chief trouble that assails the plum cultivator in this region, and that not to an alarming extent. Black Knot is not a serious evil there. The curculio (fruit weevil) has not yet made its appearance" but "In the Niagara district, the growers seem also to have, to a large extent, succumbed to the curculio".

It is also reported in the same volume that 2,000 bushels a day of plums, for a total for that season thus far of 14,000 to 16,000 bushels, were being shipped - most of the volume going to Chicago. In 1912 winter apples were the principal crop, but large quantities of plums and pears were shipped from Owen Sound. At this time, also, the Georgian Bay Fruit Growers at Thornbury had a membership of 200 and owned a sizeable storage plant.

As suggested above, the prospects of some of the area in fruit growing were considerable, although some kinds would prosper better than others - mainly because of climatic reasons. Soft tree fruits, for instance, could not do well because of susceptibility to frost extremes, even though in most other respects the climate was suitable. Even at an early date adverse weather conditions were noted to have a detrimental effect: "... plums are said to have borne

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* Ontario Agricultural Commission. Report of 1881, and Appendix B.

generously, and a scattering favourable report was heard regarding the cherry, but the majority of the reports were most discouraging regarding these fruits. Small fruits shared in the injury wrought by the heavy frost in the latter part of May; good yields were exceptional."* The Niagara District is, of course, the major Ontario source of plums and peaches at the present time due to a favourable climate.

Although a few other tree fruits are grown, the apple is by far the most important of these crops and the district has taken an outstanding position in apple production in Ontario. Its importance in this fruit has not come by chance, for not only are the soils suitable but the climatic conditions are highly favourable. Because of the lake influence "The daily range of temperature is kept within narrow limits throughout the year, with a consequent lessening of frost hazard. Spring temperatures are kept low at first, thus retarding the bloom beyond the frost date, and on-shore breezes moderate the summer temperatures, lessening the danger from scald and drought. The slow cooling of the water causes a long open fall season, permitting the colouring of the fruit and allowing the tree sufficient time to harden off the new wood in preparation for the winter."

"Protection from wind is also important. This is especially exemplified in the Lake Huron and Georgian Bay region. The Blue Mountain skirts the shore of Georgian Bay, affording protection from gales, and this is one of the reasons why areas such as the Beaver Valley are better suited to apple growing than is the Lake Huron shore."†

It would appear that the two chief hazards to the successful large-scale growing of tree fruits other than apples are late spring frosts and rather severe extreme low winter

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* Ontario Department of Agriculture. Eighth Annual Report, 1889.

† Putnam, D. F. and Chapman, L. J. The Climate of Southern Ontario. Scientific Agriculture 18:8, April, 1938.


Specialized agriculture is a feature in some areas of North Grey. This is red clover for seed.


The hardier tree fruits are important in the economy of the region. The cover crop is buckwheat.


Beef production is basic to the agriculture of the area. Good pasture is economical and helps produce good animals.

temperatures approaching 30 or 35°F. below zero.* The development of more resistant varieties of some of these fruits may some day permit their successful expansion into this area. In the meantime there is ample room, both as regards favourable soil conditions and space, to permit a large increase in apple production.

Although the apple is by far the most important tree crop grown other fruits are also produced. According to the production figures for 1957 the Georgian Bay Shore District (the shore area between Owen Sound and Midland) ranks second in production of sour cherries in the province behind Niagara. Minor quantities of sweet cherries, pears and plums are grown and also modest quantities of small fruits.

The figures below indicate the bushel production and dollar value of the Georgian Bay tree fruits for the year 1957.†

TABLE 5

Fruit	Apples	Sweet Cherries	Sour Cherries	Pears	Plums
Bushels	544,600	2,500	42,600	3,500	4,000
Dollars	697,100	14,900	217,300	6,700	7,200

The following tables indicate the rapid spread of gardens and orchards in the area after the beginning of settlement and also indicate the present situation. The significant drop in numbers of orchard trees after 1940 is due, of course, to the taking of the Cape Rich peninsula by the Department of National Defence as a military training area. It should also be noted that a large portion of the acreage was in essentially non-commercial home orchards, most of which are now old and bearing inferior crops or have been cut down.

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* For an evaluation of the peach growing possibilities of various parts of Ontario see MERCIER, R.G. & CHAPMAN, L.J. Peach Climates in Ontario. Horticultural Experiment Station and Products Laboratory. 1955-56 Report. Ontario Department of Agriculture.

† Data courtesy Statistics and Publications Branch, Ontario Department of Agriculture.

TABLE 6

GARDENS AND ORCHARDS - 1861 - 1891
(Census of Canada - in Acres)

Municipality	1861	1871	1881	1891
Artemesia	4	258	445	528
Collingwood	49	465	1,110	1,068
Derby	59	332	589	596
Euphrasia	39	325	665	740
Holland	9	286	490	535
St. Vincent	198	947	1,352	1,500
Sullivan	-	278	596	678
Sydenham	99	643	937	979
Owen Sound	-	164	432	724
Meaford	-	-	216	284
Thornbury	-	-	-	199

TABLE 7

GREY COUNTY - FRUIT TREES*
(Census of Canada)

Crop	1940	1950
Apples	149,957	121,009
Pears	6,414	5,286
Peaches	291	140
Plums	7,706	3,942
Cherries (sweet and sour)	6,554	6,529

* On farms having 25 or more fruit trees.

3. General Land Use

Other lines of endeavour were, of course, from the earliest years the backbone of agriculture in Grey. For some years wheat was an important crop for local feed and food and as an item of export. Indeed, as early as 1851 the census showed Grey County to have two-thirds of its cereal area in wheat. Thirty years later the wheat acreage in Ontario declined for a number of reasons and it ceased to be the main dependence of the Ontario farmer. The farmlands of Grey shared in this recession, but in 1880 the county was one of the largest producers of spring wheat. It was also a major producer of peas, producing three-quarters of a million bushels in 1880.

While the county has long been an important beef producer, there has also been a substantial interest in the production of milk and milk products. Not long after the establishment of the first cheese factory in British North America in Oxford County in 1864, cheese factories were established in Grey County. Such factories were located in Flesherton, Badjeros, Markdale and in other centres. There were also, of course, creameries, woollen factories, grist and flour mills and other factories processing agricultural products and manufacturing goods for use in agriculture.

4. Present Land Use in the Bighead Valley

Although the lands of the Bighead Valley have been under development for a century or more, nearly 30 per cent of the area is still in forest because of rough and stony land, steep slopes and poor drainage. Even at that, however, the amount of forest and scrub cover is still a little less than is found in most other watershed areas (such as the Beaver, Pottawatomi, and Sydenham) of the North Grey Region. This suggests a somewhat larger acreage of better agricultural land. Not all of this land is completely satisfactory for agriculture, however, and the acreage of forest will increase

as the Authority follows a program of land acquisition as recommended in the Forestry Report. The whole forestry question is discussed in this report.

Although beef production is still highly important in the region, the farmers have to some extent tried to obtain the best of both worlds through dual-purpose cattle. There is presently a trend in this part of Ontario to increasing activity in milk production. As the provincial population grows and as the urban areas increase in size there will likely be an increasing emphasis on this phase of agriculture. The large acreage of land - over half of the total for the watershed - devoted to hay and pasture reflects the interest in beef production, as does the acreage devoted to grain growing.

Corn is a relatively minor crop but can be expected to become more important if the trend of interest in dairying continues. This may well have some influence on increasing erosion rates and attempts should be made to confine this crop to slopes and soils capable of growing it with safety. As suggested earlier, erosion rates on sloping land devoted to corn, or any other inter-tilled crop such as beans or turnips, may often be rather high. Such erosion, in addition to current rates, could have a serious effect on water control structures which might be built by the Authority. Present erosion and sedimentation are causing much trouble in Meaford harbour, and have been for some years.

Earlier in this chapter it was mentioned that ample space and satisfactory soils exist in the North Grey shore area to permit a large increase in apple production. This applies in particular to the Meaford area but also to the Thornbury district where a considerable acreage has been devoted to the apple. Some of these soils, particularly some of the sands, are also well suited to the growing of vegetable crops. Not only would the soils and climate be favourable but the proximity of Georgian Bay might also


Gravel for roads and building materials is taken from the Oxmead beach and many other places.


Oats is a major grain crop in the Bighead Valley.


Pastures filled with weeds and scrub are a luxury we can do without.

TABLE 8

BIGHEAD
PRESENT LAND USE

Land Use	Acres		Per Cent	
Forest and Plantation	19,259	23,754	22.8	28.1
Forest Scrub	4,495		5.3	
Pasture - Unimproved	21,524	43,204	25.4	51.0
Improved	5,204		6.2	
Hay	16,476		19.4	
Spring grain	174	13,881	.2	16.3
Mixed grain	7,244		8.5	
Oats	5,407		6.4	
Barley	296		.3	
Corn - ensilage	760		.9	
Orchards	347	404	.4	.5
Garden crops	57		.1	
Rape (seed)	22	58	.05	.1
Flax	36		.05	
Idle	865	1,459	1.0	1.7
Fallow or crop not in	694		.7	
Farmsteads	1,284	1,929	1.4	2.3
Abandoned farmsteads	95		.2	
Urban	499		.6	
Gravel pits, water, etc.	51		.1	
Total		84,689		100.0

favour community irrigation should irrigation prove desirable.

The following table summarizes the present land use picture in the Bighead Valley. A proportion of this acreage is devoted to municipal roadways. In this connection it should be noted that over 8,000 acres of the North Grey Region is devoted to existing public roadways. The Bighead Valley probably has over 1,000 acres in such use.

CHAPTER 4

LAND USE CAPABILITY

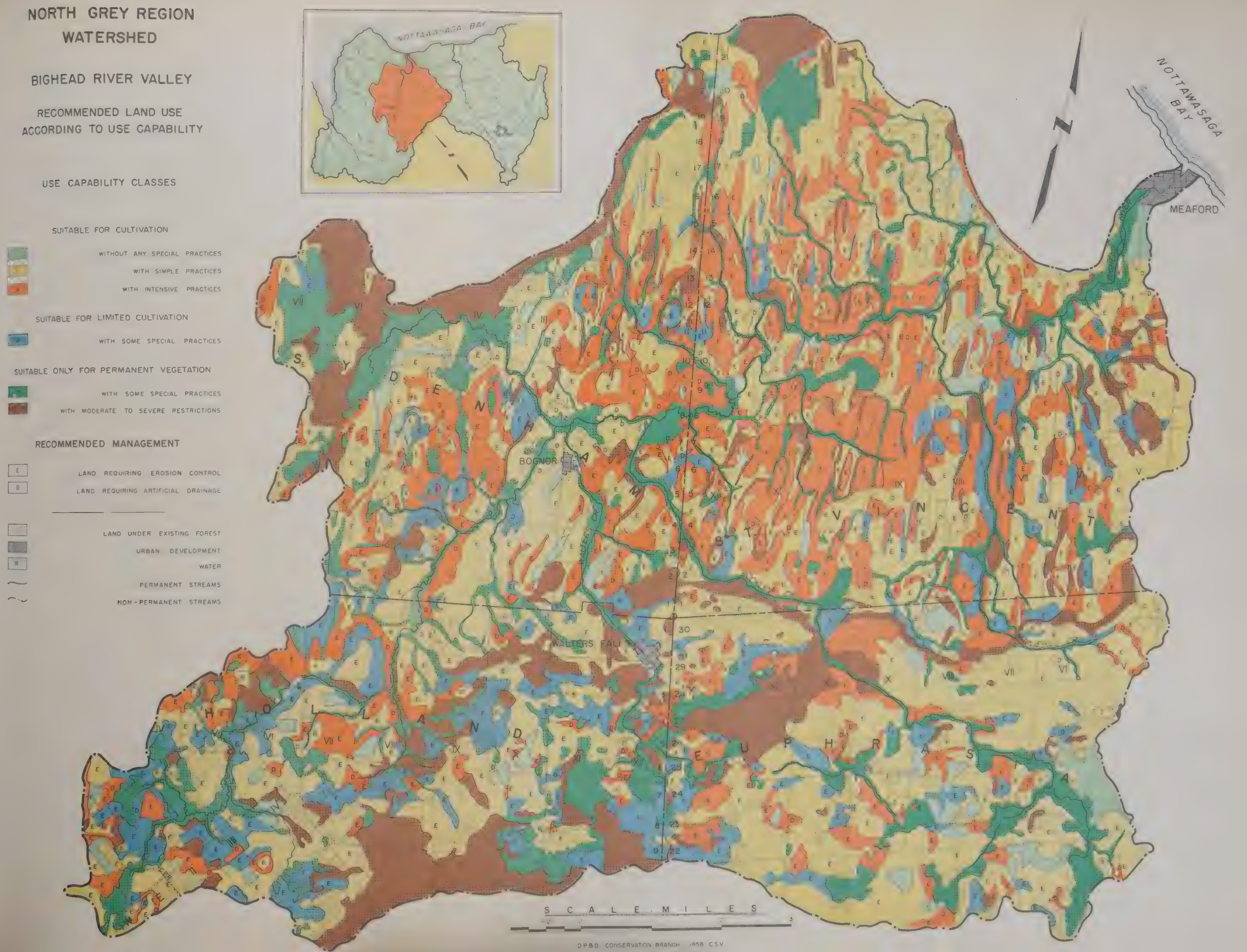
1. Introduction

The use capability of land depends largely on the climate and on the inherent characteristics of the soil. Within limits which are not necessarily rigid man may modify some of these factors by draining, irrigating, fertilizing, land levelling, the use of better crop varieties and so on. In general, however, the nature of the land determines the general use to be made of it and suggests the kind of use which should be made of it. The farmer should always try to fit his husbandry to the land, not vice versa.

One of the most important aims of conservation is the adjustment of use and the management of land according to its capabilities. In this way the greatest long-run economic return will be obtained and the continued productivity of the soil maintained.

On many of the fields on most of the farms of Ontario the land is variable in quality because of changes in the soil itself, in slope, and in drainage. Most farmers know and appreciate the fact of these differences and many, by themselves or with technical aid, adjust use to capability. To bring about efficient use of land each farmer needs to make an inventory of his land and its capability. Considerable individual assistance in this matter may be obtained through the farm planning facilities of the Soil Advisory Service of the Ontario Agricultural College.

Any long-range program of conservation work eventually (often quite soon in some forms) runs into the question of land capability, for many of our land problems stem from a lack of, or a poorly balanced adjustment between use and capability. Each piece of land an Authority acquires for reforestation, for example, is a concrete example of an attempt by the Authority to match long-term public good to


NORTH GREY REGION WATERSHED
BIGHEAD RIVER VALLEY
RECOMMENDED LAND USE ACCORDING TO USE CAPABILITY
USE CAPABILITY CLASSES
SUITABLE FOR CULTIVATION
WITHOUT ANY SPECIAL PRACTICES
WITH SIMPLE PRACTICES
WITH INTENSIVE PRACTICES
SUITABLE FOR LIMITED CULTIVATION
WITH SOME SPECIAL PRACTICES
SUITABLE ONLY FOR PERMANENT VEGETATION
WITH SOME SPECIAL PRACTICES
WITH MODERATE TO SEVERE RESTRICTIONS
RECOMMENDED MANAGEMENT
LAND REQUIRING EROSION CONTROL
LAND REQUIRING ARTIFICIAL DRAINAGE
LAND UNDER EXISTING FOREST
URBAN DEVELOPMENT
WATER
PERMANENT STREAMS
NON-PERMANENT STREAMS
NOTTAWASAGA BAY
NOTTAWASAGA BAY
N
MEAFORD
BOGNOR
WALTERS FALLS
SYDENHAM
ST. VINCENT
HOLLAND
EUPHRASIA
SCALE MILES
O.P.B.D. CONSERVATION BRANCH 1958 C.S.V.

and capability. By and large such land is deficient in one or ore respects for profitable agricultural use and would normally e defined as class V land, or worse, in the classification utlined below. Except with good reason no Authority would take ver better land for any use but agriculture. Even agricultural and may be graded into various categories according to its apability and suitability for use.

In order to assist the Authority in its present nd future work the capability of the land throughout the Bighead Valley was judged and a map prepared delineating the various classes of land. A copy of the map accompanies this report.

The land of the watershed may be divided into four broad classes on the basis of its suitability or unsuitability for agriculture. In assessing the suitability of a piece of land for agricultural use, the piece of land in question is rated according to one of the following categories, the rating depending on a number of things including soil, slope, erosion, erosibility, drainage, and inherent fertility.

A - Suitable for cultivation

B - Suitable only for occasional cultivation

C - Suitable only for permanent vegetation and unsuitable for general cultivation.

D - Not suitable for cultivation or for commercial grazing or forestry.

Within these broad categories various classes of land are recognized.

A - Suitable for Cultivation

Class I - Without any special practices over and above what is considered to be good farming for the area. This land may be continuously cultivated with safety and will produce good crops for an indefinite period.

Class II - Requires moderate restrictions in use and more specialized conservation practices to produce good yields with minimum risk to the land.

Class III - Needs extensive restrictions in use to provide good crops on a sustained production basis with minimum risk to the land.

B - Suitable only for Occasional Cultivation

Class IV - Best used for permanent vegetation but may be safely cultivated occasionally to certain crops.

C - Suitable only for Permanent Vegetation

Class V - Normally uncultivable because of restricted drainage, periodic flooding or topographic difficulties. No special practices or restrictions are required.

Class VI - Requires moderate restrictions in use.

Class VII - Needs severe restrictions in use.

D - Not suited to Cultivation or Commercial Grazing or Forestry

Class VIII - Includes areas of rock outcrop or marsh which do not lend themselves to cultivation or commercial grazing or forestry.

2. Recommended Land Use According to Use Capability

These land-use capability classes may be converted into classes of recommended use by indicating generally what special practices and restrictions are required for each type. In this report this has been done by adding the letters D and E to those areas designated as Classes II, III and IV. On Classes V and VI, recommendations are given as needed. No special practices are required on Class I land and normally no restrictions are placed on use.

The symbol D is applied to those land classes where restricted drainage is the main use problem and where, in most cases, artificial drainage would correct the problem. Practically all of this land is level to very gently sloping and erosion is not usually a difficulty. Where it is the drainage should be accompanied by sterner erosion control measures than would normally be the case. Particular attention should be paid to providing adequate outlets for tile drains so that the possibility of gullies developing from this source is eliminated.

The symbol E is applied to those land classes where erosion or susceptibility to erosion is the chief hazard. It includes land capable of being cultivated on the contour and land where the topography is too broken to be dealt with in this fashion.

Land Class I

A rather small proportion of the watershed, some 3 per cent, may be considered as Class I in quality. Such land is quite level or gently sloping, well drained, free from erosion and stoniness and fairly fertile. With reasonable care it will remain productive for a long time to come. No extraordinary practices are required to keep it productive but it should be cultivated, fertilized and managed to best advantage. Land such as this should be suitable for more intensively cultivated crops such as corn.

Land Class IIE

Like the Class I land, this type is generally well drained, stonefree (in respect to stones being an impediment to cultivation) and reasonably fertile. Because of steeper slopes, and sometimes of more hummocky terrain, erosion is a more serious problem. Erosion may be prevented and controlled by the use of satisfactory rotations, winter cover crops, maintenance of the soil organic content and restriction of intertilled crops, particularly on the more steeply-sloping land. Most of this land, some 32,500 acres, and approximately 38 per cent of the watershed, is used for the general farm crops of the area. Some is being used for woodland but the acreage involved is not large. Part of this land might be cultivated on the contour, particularly those sections associated with the drumlins, but broken slopes on the balance would make this practice difficult.

An example of Class IID land with an imperfectly drained silty clay loam soil.

Contourable land of this type is fairly common on the watershed. The strip crops of hay and grain run at right angles to the slope.

This picture illustrates a fairly good adjustment of use to land on a drumlin. The steepest slope is in a minor woodlot which could be improved. Hay is on the medium slope and oats on the shallowest slope.

Land Class IID

A relatively small amount of land is included in this class, a little over 3,000 acres altogether. Much of it is associated with heavy-textured Kemble soils of the drumlinized till. The land is level to gently sloping and imperfect soil drainage is the main restriction to easy cultivation and favourable yield. In large measure this land has been cleared and is devoted mainly to the production of grains and forage crops.

Land Class IIIE

The land in this class is similar to that in Class IIE but conditions are generally more severe - the slopes are steeper, erosion is greater, or the erosibility factor is higher. Nearly 15,000 acres of land are considered to lie in this class.

Some of this land is suitable for contour cultivation and contour strip-cropping but there is also a large acreage where the slopes are broken to the extent that this type of cultivation would be difficult or impractical. The cultivation and remedial measures required to correct or prevent erosion on such land includes rotations, cover crops, grassed waterways and the elimination, as far as is practical and possible, of intertilled crops. Fertility improvement and the maintenance of a high soil organic content may also be necessary for maximum yields.

Land Class IIID

This land is similar in many respects to that found in Land Class IID. It differs in that the drainage is poorer and more of it is covered with forest or scrub. Even where cleared erosion is a minor problem because the land is level to gently sloping. Improvement of soil drainage to a satisfactory level will usually be somewhat expensive but may improve yields and cultivation costs to the point of retiring them in several years.

Land Class IVE

A fairly large acreage of this land exists in the watershed (over 7,000) and a good deal of it is associated with the morainic lands of the southern section. Soil fertility may be reasonably good but the capability is often lowered by steep slopes, greater erosion, and a higher susceptibility to erosion. In some cases the class includes, because of an erosion problem, land which would otherwise be considered as in Class III.

Class IVE land should be restricted from regular cultivation because of the rough topography and the susceptibility of the soil to erosion. Land of this class is best placed under a permanent grass cover with controlled grazing. Occasional cultivation to provide pasture renewal may be carried on with reasonable safety. The occasional grain crop may also be grown.

Land Class IVD

Considerably less than one per cent of the watershed acreage falls into this class. These areas are wet and cannot be drained economically or easily. Erosion is negligible and in a dry year, with a lower water table a crop may be taken off. Generally, however, the land is devoted to pasture or woodlot.

Land Class V

This type includes those areas subject to periodic flooding, chiefly the flatlands adjacent to the streams but also including swamp and muck areas. For mapping reasons, some of the steeper sloping land of the valley slopes is included. This land would be rated normally as Class VI, VII or VIII. These slopes are almost completely forest land but may, along with the bottomland, have considerable recreational value. The bottomland itself is variable as to soils and drainage and is useful mainly for pasture and forest. Where the area is extensive enough it may make good cropland. Bottomland pasture generally requires a minimum of care, but an

attempt should be made to minimize over-grazing and damage to streambanks. Such land takes in over 11,000 acres of the watershed and some of it will undoubtedly be acquired by the Authority for forestry and recreation purposes.

Land Class VI

Occupying nearly 11,000 acres of the watershed, this type is highly variable as to soils, topography and drainage, and embraces, in addition to the land which would normally be considered Class VI, areas of Class VII and Class VIII land. The difficulty of mapping these three classes separately in the time available made it necessary to lump them together into one class. A good deal of this land is steeply hummocky and possesses arid, stony or low-fertility soils. Most of the rest is rock plain thinly covered with soil, is steep or is bare rock. Where any exists, the cover consists generally of various types and qualities of forest, scrub and pasture.

By and large, this land is useful chiefly for forest production, wildlife and recreation. At many points the topography and soil permit grazing but where this use is carried on care should be taken to see that overgrazing is not practised.

In the following table are summarized the watershed conditions from the point of view of land capability related to the kind of agriculture carried on in the area. These capabilities are expressed cartographically on the accompanying map.

TABLE 9

RECOMMENDED LAND USE

Land Class	Acres	Per cent
I	2,839	3.0
IIE	32,574	38.5
IID	3,114	3.6
IIIE	14,716	17.5
IIID	2,194	2.6
IVE	7,096	8.4
IVD	230	.3
V	11,186	13.3
VI,VII,VIII	10,740	12.8
Total	84,689	100.00


Low-grade land is often unable to supply an adequate income to those who farm it.


The steep, rolling lands of the moraines are often droughty and weedy.


Many streams are trampled and polluted and afford poor habitat for fish.

CHAPTER 5

CONSERVATION MEASURES

1. Introduction

One of the chief aims of conservation is that land shall be used and managed according to its natural capabilities. Usually there exists the possibility of using a piece of land in several different ways. Some of these uses may fit the capability of the land very well and others may not. It may be possible, for instance, to use a piece of hummocky land for the production of grass and occasionally grain and actually improve the fertility and tilth of the soil. Under persistent production of corn or potatoes the same soil might become badly eroded and suffer severe loss of fertility.

There are many soil and water conservation measures and methods, some complex and some simple, but they are all directed toward the elimination of bad land conditions, the improvement of the soil and its fertility and the production of better crops and animals - if possible more cheaply than before. Not all of these measures are necessarily suited to any one section of the country; the requirements of range land may be different to those of a dairy area or of a truck crop producing area.

Likewise, different fields on a farm may need to be dealt with differently because of differences in soil, in slope, in drainage and in use. Where the recommendations of a report such as this may apply to a larger area, the watershed, the recommendations applied to a small segment of the watershed, a farm, will be more specific and come, perhaps, from a farm plan.

To ensure that the land is used as nearly as possible according to its capability a plan is a requisite. Its purpose is to indicate what each part of a farm is best

capable of producing. From ascertaining the physical conditions of the land the cropping and rotations of each piece of land are arranged and steps taken to maintain soil fertility, check soil erosion and gully development, rebuild topsoil where it has been lost through erosion, and protect waterways against gullying.

Conservation measures may be considered as being cultural or mechanical in nature. Cultural methods include such practices as intensive rotations, improved pasture, and the use of cover crops. The proper management of the woodlot may also come under this heading. Mechanical methods include drainage, farm ponds, contour ploughing, strip cropping, terraces and grassed waterways.

In the following sections are described briefly some of the conservation measures which may be used successfully in reducing erosion, increasing water insoak and maintaining fertility. No importance should be attached to the order in which they appear.

2. Crop Rotations and Cover Crops

A crop rotation means following a regular sequence of crops on a field with the same, or much the same, sequence repeated every several years. Cover crops are those crops which are planted mainly to protect or rebuild the soil.

The repetition of some cropping and tillage practices leads to rapid depletion of soil nutrients, the destruction of soil tilth and organic content, and exposes the soil to sheet, rill and gully erosion.

A good rotation installed with an eye on the land can aid materially in combating these results of malpractice. A rotation system, through the growth of different crops in sequence, draws plant nutrients from different levels, adds fibre with the ploughing under of crop residues, and improves tilth with alternative systems of tillage.

A large part of the value of crop rotations and cover crops depends on their ability to rebuild the soil, protect it from erosion, maintain organic matter, add nitrogen and keep the soil in good tilth and increase the amount of water absorption. Better crops are a result. Crop rotations and cover crops are, therefore, among the more important tools of the conservationist.

Crops may be classed as soil-building (the grasses and legumes) and soil-depleting (grain, corn, root crops and some other hoe crops). The latter group exhaust the soil most rapidly and expose it more readily to erosion and drought. The conservation farm planner tries to arrange the cropping systems field by field, so that the land of lower capability, subject to erosion or already eroded, has more of the soil-building and less of the soil-depleting crops. Land subject to serious erosion, or in that state, is likely to have the hoe crops excluded from it entirely. Under a suitable rotation the acreage of grain or hoe crops may be reduced but the yields maintained or even increased by making the land more productive.

3. Drainage

Although restricted drainage is not widespread on the lands suitable for agriculture there do exist areas where adequate artificial drainage would be beneficial and is economically feasible.

Often the natural drainage of the soil is insufficient to provide a good environment for the growth of most farm crops. Under natural conditions the soil may produce a crop, but one lacking in quality and yield because of excess amounts of water. Artificial drainage of land like this enables the soil to produce higher quality and more abundant crops and helps provide the farmer with a higher return for the same labour as before. By having a planned and effective

drainage system the farmer is not only able to enter on his land earlier but the seeds can more readily germinate and the plants can send down deep root systems early and more readily withstand summer drought. It is a fact that farm underdrainage will often pay for itself within two or three years after installation through reducing operating costs, reducing seed loss through faulty germination, and through higher yields. The farmer may also get on his land much earlier than before.

Drainage makes it possible for soils of high inherent fertility, but of restricted drainage, capable of carrying the full range of crops that are carried on the well drained soils of the region. Strangely enough, poorly drained soils can become seriously subject to drought. In the early, wet part of the season crops cannot root deeply while in the hot, dry season moisture does not move readily upward in often-massive, poorly drained soils and the shallow-rooted crops suffer from drought.

Drainage by open ditches is generally less suitable on a farm than tiling for several reasons - they harbour weeds and they soon become overgrown; they fill with silt; they may be a hazard to, and be trampled by, livestock; they require periodic cleaning for effective life. Drains of this type have the advantage of lower initial cost. Most important, perhaps, they are suitable for draining a depression but not too suitable for general soil drainage because of a limited active zone to either side of the ditch. In heavy land even tile drains must be located close together to be effective.

Beyond dispute, there are many areas in Ontario which should never have been drained and in which the drainage works have failed to function effectively. Likewise, there are areas in the present watershed, and in the North Grey Region as a whole which should not be drained. The cost of doing so would in many cases be uneconomic in relation to benefit and the work might also adversely affect wildlife and water

resources. It is believed that nearly all of those areas of poor drainage belonging to Land Classes IV, V and VI would be better left undrained and devoted to forest and wildlife production and water storage. It is therefore suggested that the Authority urge that any proposed drainage works (particularly those at a municipal level) be reviewed from the point of view of whether the soil needs draining and whether the interests of all concerned would be best served by such drainage.

Where tile drainage would be to advantage the system should be properly installed, the tile should be adequate in size, and there should be a sufficient number of lines. In addition, they should be well protected. This important part of the drainage system is one too frequently overlooked and as a consequence often causes considerable trouble. To provide good outlets, the last few feet of drain should be of vitrified tile or corrugated metal pipe extended several feet out into the ditch or stream. It should be provided with a head wall to prevent cutting back and an apron to prevent scouring. Neglect of these important details can and has led to the development of serious gullying in Ontario and elsewhere. A screen or gate over the tile outlet will prevent the entry of animals and risk of plugging tile. Recent developments in low-cost continuous-arch plastic "tile" may provide an economical means of achieving adequate underdrainage in some soils.

4. Contour Cultivation and Strip-Cropping

Contour tillage entails the adoption of methods whereby the land is cultivated "on the level" along the contour and at right angles to the slope. The best slopes for this treatment are broad, smooth and not too steep. Satisfactory work may sometimes require the removal and/or relocation of a fenceline. Most farm fields in Ontario were fenced according to the rectangular survey grid and not

according to the "lay of the land". Thus, when considered from the point of view of how to work the land best the need for fenceline adjustment is obvious. By a happy coincidence the survey grids of the Bighead Valley townships agree favourably to a considerable extent when related to the longitudinal orientation of the drumlins in the drumlin field. This agreement makes contour cultivation of the smooth drumlin slopes a much easier and more fruitful proposition than is often the case.

When the land is tilled on the contour each furrow or drill row acts as a small dam to retain the run-off water which is better able to be absorbed by the soil. This is particularly true during the period when the crops are making much of their growth and need the water most. As time goes on the small cultivation ridges become levelled by rain and wind and become less effective. By that time the crop itself has grown sufficiently to offer protection to the soil.

Besides the benefits obtained through the reduction of water and soils loss, contour tillage offers greater ease and economy of operation of powered implements. If the strips are fairly long, turning has to be done less frequently, and of course gear-changing and changing power loads are reduced. One study showed time savings of nearly 13 per cent and fuel savings of nearly 10 per cent when contour cultivating with powered implements.

Strip-cropping is often carried on in conjunction with contour tillage. This means the establishment of hay or pasture strips on the contour, and alternating with strips devoted to grains or intertilled crops. By the use of such a method any water which escaped from the cultivated strip, and which carried soil with it, would be slowed down by the grass and the sediment dropped. This strip-cropping has in mind mainly the reduction of water erosion. In the tobacco area of Norfolk County strip-cropping is common on the

level and gently-rolling sands. The main purpose in this case is the protection of the land from wind erosion.

5. Grassed Waterways, Diversion Channels and Gully Control

Many fields on the watershed have small channels crossing them which collect water from their own small watersheds in spring and after heavy rains and the rest of the time are dry. Nearly always these channels are cultivated with the rest of the field and no attempt is made to protect them. This results in a gradual enlargement of the channel through erosive downcutting, erosion of adjacent slopes, a heavier silt load for the main stream and, if the watercourse debouches onto the flatter land, a fan of silt and gravel which increases in size and covers the crop. This can happen on very gently sloping as well as on steeper land.

These waterways should be planted to grass, should be wide enough to handle expected flow, and should be maintained. The banks of the waterway should be gently sloping and the grasses used should be those which will provide a thick, interlocking sod. Under management a waterway can provide substantial amounts of hay and pasture and aid in the delivery of clean water to the streams; the thick sod reduces the speed of the overflow and leads to the deposition of the silt load in the waterway.

The simplest grassed waterway is established by tripping implements as they cross the sod on a watercourse when the hay or pasture in a field is being disced or ploughed under. This type would find wide application on the watershed. By filling and grading it is also possible to convert gullies into grassed waterways. Such a measure is, of course, more difficult and more expensive to do and may require the diversion of water from the head of the gully, at least until control has been established. Fortunately gullies of consequen are not common in the area.


A newly excavated pond which would last longer and supply cleaner water if fenced and provided with a trough or appraoch for cattle-watering.


Natural ponds like this may often be improved at low cost by deepening and fencing.


Unfenced, inadequate ponds may be destroyed or polluted by cattle trampling.

The importance of sod waterways, in conjunction with contour tillage, in the reduction of watershed run-off has been shown by studies in Ohio. These studies showed that a reduction of 75 - 80 per cent was gained at the start of the season. This dropped to as low as 20 per cent later but produced an annual average reduction of 66 per cent. A reduction of even 20 per cent is valuable and one of 66 per cent even more so. The significance of this on the production of better crops and higher yields will not be lost on most farmers.

As suggested above, gully prevention may be established through the use of grassed waterways. Gully control may also sometimes be achieved through use of the same measure. Where gullies do exist their repair will, in most cases, have to be undertaken by the individual who usually has the necessary machinery to do the job. The Authority or the Agricultural Representative's office may, of course, supply technical advice. The Authority might consider offering more direct assistance in those cases which are beyond the capacity of the individual to deal with effectively.

6. Farm Ponds

In recent years there has been a considerable development of interest in farm ponds in Southern Ontario and a large number have been built. At the forefront in support of this development have been the various Conservation Authorities.

An adequate water supply is essential on any farm although the amount needed and the use or uses to which it will be put will of course vary. In most areas the use of water is increasing and there is a continuing search for new or better supplies.

On most farms water is needed for domestic use and for stockwatering and the supply often fails or is much reduced in a dry year. With the increasing use of water for

irrigation of special crops such as tobacco and fruits and the possibility of irrigating such crops as pasture a good water supply becomes an imperative need. Most often supplies of this order are unobtainable from ordinary wells and recourse must be made to ponds.

Farm ponds are excellent as a source of water for most uses and they may be designed quite readily to fit the needs of the farm. Too, the pond may be good for more than a single use as, for example, for orchard spraying, stockwatering, irrigation, recreation, fire protection and fish. When designing the pond the probable uses should be kept in mind.

Surface water supplies in the Bighead Valley are generally good and many of the streams flow year 'round. There are, however, sections and farms where water supplies are inadequate. This lack may in many cases be met at relatively low cost by constructing farm ponds. The North Grey Conservation Authority may wish to follow the lead of other Authorities in providing financial assistance in pond construction, but this assistance should be hedged in by conditions requiring adequate construction and maintenance standards and should be discontinued when it is apparent that the idea of farm ponds is generally accepted by the watershed farm population. The Authority should always, of course, promote the idea of ponds and might continue technical assistance as a general policy.

The Authority is urged to publicize the desirability of adequate construction and maintenance standards in farm ponds. It should be emphasized that care be taken in building the dams and spillway channels of run-off and permanent stream ponds. A large number of dams in the province have failed, and continue to fail, because this has not been done. It might also be pointed out that permission is required from the Surveyor-General for Ontario before any structure can be placed across any permanent stream.

7. Farm Planning

To most farmers the idea of planning is not something new; in some measure or other they plan the use and management of their land so that they know a year or so in advance what cultivation sequence they are going to follow. They plan for repairs to buildings, equipment, fences and so on. They plan so far as they can the day to day and month to month work they are going to do, and much of it becomes routine. Planning, in short, is an essential feature in the life of the farmer as it is with anyone concerned about his future.

Although many farmers have a plan regarding the use to which they put certain or all of their fields, relatively few have had their farms planned so that the maximum use, consistent with the best use, is made of each piece of land. The object of a plan of this sort is to enable the farmer to get the most out of his land and at the same time to do it in such a manner that no damage to the land occurs. When a farm is planned each piece of land is judged according to its capability to produce, and various use recommendations are made. These may include pasture management, crop rotations to follow, woodlot management and reforestation, farm drainage, fenceline removal or relocation, or any other works and practices which would benefit the farmer and his land.

Planning does NOT need to be so rigid that there is only ONE recommended use or management for a piece of land of one class. Alternative recommendations may be made for a piece of land in a certain class. The first rule is to apply the easiest and cheapest remedy. The next thing that determines the choice of use is the relation of the field to the rest of the farm. Other factors apply, such as suitability for using powered mechanized equipment, or the distance from the barn and ease of access. The final determination depends on the crops and animals the farmer chooses to carry. The final plan, therefore, is the end result of a good many

compromises and at each stage of preparing the plan certain choices have to be made.

In developing the plan a farm planner goes over the farm field by field and maps the soils as he finds them. He uses an aerial photograph as a base map. The soil series and types are identified and an estimation of the degree of erosion is made by examining vertical sections of the soil. The slope of the land is measured, using a hand level which gives slope as a percentage. A rise of four feet in a run of one hundred feet, for example, is a 4 per cent slope.

The occurrence of watercourses, either permanent or intermittent, with or without a definite channel, is noted, as are fencelines, stonepiles, springs, seepage areas, gullies or any other items of importance.

All of the information gathered is marked on the map, using symbols, and each piece of land of the same type with respect to soil, slope and erosion is delimited by a boundary line.

From the map of soil type and conditions a map of use capability is prepared. Each piece of land is assigned to one of eight capability classes. These classes are the same as those used for the watershed. On any one farm not all classes will necessarily be found.

The plan of the farm is then worked out with the farmer so that each field, or each piece of land, is put as nearly as is practicable to the use which fits the capability. Any systems of tillage or cropping or special practices to control erosion and water loss are applied where necessary. The fields and rotations are worked out so that there is the correct balance of pasture, fodder and grain to meet the requirements of the herd which the land can carry.

Before the planned rotations are put into effect it may be necessary to arrange a transition period in

which the changeover from present cropping to the planned rotation is made without losing a year of cropping. Also, it may take a year or two to get special devices like grassed waterways and terraces in working shape. A time of transition such as this may also prove useful in providing a period during which any desired changes in the plan may be implemented.

In adjusting use to capability it may not be possible to outline fields exactly according to natural soil conditions. The inclusion of a small area of, for example, Class II land in a field which is predominantly Class I land may mean that this small area of land of lower capability will be worked as intensively as the Class I land. This is not strictly following the principle of "using each acre according to its ability", but is a compromise weighed against the possible cost of fence removal, difficulties of tillage and so on. In a plan, therefore, there may be found one or more small areas of one land class within a larger area of another land class.

8. Grassland

The production and management of first-class improved pasture is no simple job for it is both art and science and requires substantial knowledge on the part of the farmer. Perhaps first and foremost is the fact that pasture is a composite of grasses and legumes, each with its own peculiarities and demands. The selection used must fit, as nearly as possible, the peculiar soil characteristics of the field and must also stand up to maximum browsing by livestock as well as climatic variations.

In an area such as the present watershed where livestock products are so important and hay and pasture cover so much of the total acreage it behooves the farmer to make the most of his grassland. It should never be considered a lesser use of land but one which will pay dividends for

adequate care. Successful pasture depends on many things including the quality of the seed, the seed mixture, the physical and chemical condition of the soil and the treatment of the pasture once it is in production. Soil tests and the application of fertilizer are just as important in the production of top-quality pasture as in the production of other crops.

It should also be pointed out that grassland has high importance in controlling erosion and improving soil moisture relations. Grasses and legumes provide organic material for the soil and protect it almost completely against erosion. By improving the soil structure and providing a continuous cover the impact of the rain is dispersed and the water is more readily able to enter the ground to the benefit of the crop and of the groundwater supplies.

In any matter concerning pasture production the farmer should consult his local Agricultural Representative who can, if necessary, obtain further expert opinion in the solution of a problem. He may also consult many bulletins on the subject and a few of these are listed below*.

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* Useful bulletins include:

(a) Guide to Crop Production in Ontario. Ontario Department of Agriculture, Extension Bul. No. 68.

(b) Soil Management and Fertilizer Use. Ontario Department of Agriculture, Bul. No. 497.

(c) Better Ontario Pastures. Ontario Department of Agriculture, Bul. No. 469.

(d) Fertilizers for Cereal, Hay and Pasture Crops. Ontario Dept. of Agriculture. Circular 144 (Rev. May 1955).

(e) Better Pastures in Eastern Canada, Dept. Agri. Ottawa, Pub. 809. Farmers Bul. 150, Oct. 1948.

Farmers are often unaware of the many services and professional advice available to them through their Agricultural Representative, Zone Forester and Conservation Authority Field Officer and it is recommended that the Authority publicize this matter as fully as possible.

9. Forests

The land use and forest inventories are closely co-ordinated and recommendations regarding reforestation and the acquisition of forest land by the Authority result from the work of both sections. A full discussion of the forest resources of the Region will be found in the Forestry Report.

CHAPTER 6

LITTLE VALLEYS

A small organization is probably almost always more easily managed than a large one and this is certainly true when it comes to the question of improving the lands and waters of a valley. It is true, we think, because an attempt of this kind very largely depends on the enthusiasm and co-operation of the individual land-holders. They must come to the realization that what they do on their farm may have far-reaching effects on their neighbours downstream. Too rapid run-off, erosion, and a silt-laden and polluted stream do harm to both and cost money in lower yields, deficient or poor water supply, lost recreational values, silted harbours requiring costly cleaning as at Meaford, and in many other ways.

Most people have positive opinions concerning the city, town, village or township they call home and are justifiably proud of their community and anxious to see it progress and improve. A river valley is another community of which the individual can be proud. He can and does have a direct interest in the stream and the lands which it drains, for his land is a part of the whole.

However, to further the improvement of a valley and to stimulate interest and pride in its lands and waters may be too big a job, when done on the scale envisaged here, when the watershed is the size of the Bighead Valley, or the North Grey Region which is even larger. To simplify the task of an Authority and to bring about the desired results more rapidly it may be desirable to select one of the tributary valleys for improvement to illustrate what can be done by co-operative effort. In a smaller valley co-operation may often be achieved more easily because of the smaller number of people involved and because the limits and condition of the area are better known to them.

Such a tributary valley, hereafter, for convenience, called the Dunedin Creek after the major soil type in its headwaters, has been selected because of certain conservation problems which it contains or contributes to. The valley is small, being only some 2 square miles in area, and contains the property of only a few landholders. For these and other reasons it is believed the valley may be a good place to start on a program of general land improvement which may eventually become Authority-wide. Good land use must be the basis of any successful conservation program.

This valley is also referred to in the companion report on Water, which supplies a good deal of statistical information related to the silting of Meaford Harbour and the costs of removing the silt. Only a small portion of this sediment comes from the agricultural lands of Dunedin Creek; much of it comes from elsewhere in the Bighead Valley - from streambank erosion, from roadside ditches and, of course, from agricultural lands.

A good deal of the silt being contributed to the main stream by the Dunedin Creek Watershed comes from the steep slopes along the stream and from the rough open land of its headwaters. As described earlier, these heavy clay soils of the upper part of the watershed are open to serious erosion unless well managed. The erosion which exists suggests that the problem be examined closely and steps taken to correct it. Most of this land where erosion has been noticeable should be devoted to the production of hay and pasture with considerable regulation to prevent overgrazing, or should be reforested. The same thing applies to the steeply sloping, fine-textured tills elsewhere. Several areas on which it would be desirable to carry out private reforestation are indicated on the forestry map in the companion report on Forestry.

Development of this little valley to improve the land use should be fostered by the Authority but several

things should be kept in mind:

(a) The problem and its proposed solutions should be pointed out to the farmers whose lands lie wholly or in part in the valley. Their support and active interest in the project must be gained.

(b) There is a need to do research in the Bighead Valley from the point of view of ascertaining stream turbidity from silt, run-off rates, etc. The Dunedin Creek Valley appears to be a good place to start such research. The farmers involved should be made to feel that they form an integral part of this research and that their land use methods might have profound effect on the results.

(c) The whole program of improvement in the valley should, perhaps, be regarded as a research development with, as a consequence, some of the necessary funds coming from the Authority on this basis. At the same time the individual should contribute according to his gain.

(d) It should be remembered that such a project may well be the start of further development in general land use improvement.

(e) The costs and benefits should be carefully measured and publicized with a view to expanding the project.

(f) Reference should be made to the report on Water for information concerning stream gauging, silt measurement, weir construction and other hydraulic matters.

(g) Reference may also be made to the Water report for a map of the Meaford area containing an outline of the Dunedin Creek Watershed.

(h) The Land Use Advisory Board of the Authority should appoint a Dunedin Creek Committee to look after developments in the area. The local farmers should be represented on this Committee.

A program of little valley improvement requires the active support of all the people living within its confines and the improvement of such a valley has a number of advantages. In the first place the results of such action as is taken can be shown directly, partly in better production from the land and partly in the betterment of the stream which is shared by all. Secondly, the accumulated effect of conservation measures is greater when they are

applied on neighbouring properties. Also, as new methods or ideas are introduced they may be applied to an area rather than to isolated farms. Some of these methods may involve the use of techniques and equipment beyond the capacity of the individual but well suited to group effort.

While the ultimate goal is the improvement of the valley as a whole, with every farmer and other land user co-operating with the Authority in its efforts, the success or failure of the project depends on the individual farmer. He is the one responsible for the improvement of his own farm. He is also the one who has to cope with the unique conditions found on his farm. Nevertheless, the responsibility for initiating and furthering the plan belongs to the Authority. It can contribute a great deal by helping to bring to the farmer the information he needs to help him grow better crops and improve the condition of his land.

Land improvement does not necessarily entail the use of costly machinery or of expensive installations which would be beyond the economic capacity of the average farmer. Most farmers have at hand nearly all the machinery they would require for most works. Many conservation measures such as contour tillage, require only a different method of operation from that habitually used, or an increased emphasis, such as increased use of fertilizer or the clipping of pastures, on the one already practised.

Although it may be conceded by the farmer that the application of adequate conservation methods is good the idea will fail to take hold unless the farmer can see direct benefit. It has been proven that applied conservation measures do pay, particularly after they have been in use for a year or so. Not only does the land produce more at lower cost but the run-off is controlled, the structure of the soil is improved and erosion reduced. For instance, one study, made using a variety of implements

in a considerable number of tests, revealed that contour cultivation resulted in average time savings of nearly 13 per cent and fuel savings of over 9 per cent as compared to uphill - downhill cultivation. Savings such as these are not to be ignored, particularly when the cost of conversion to such a system may be small. The main need is a desire on the part of the farmer to do things the better way.

CHAPTER 7

AN AUTHORITY PROGRAM FOR LAND IMPROVEMENT

The condition and use of the land in the Bighead Valley and in the North Grey Region have been discussed at some length in this report and from time to time suggestions have been made as to where the Authority might apply or find its interest. The purpose of this chapter is to gather together these suggestions and recommendations and to add a few more which seem worthy of consideration by the Authority.

The Authority can hope to carry out by itself only a small proportion of the conservation work required on the watershed. This work will be in fields where a public interest and need is involved and where a public body such as the Conservation Authority is the only one capable and with a term of interest long enough to do the work. Reconciling land use with land capability is a long-term proposition which must, for the most part, take place on private farm holdings. Our farmers are the stewards of our land and the achievement of this reconciliation must come, it would seem, from the farmer recognizing that there are better ways of doing things and that his way is not necessarily the best way. Perhaps the most important general recommendation of this report, therefore, is that the Authority devote part of its budget and part of its energy to the publicizing of the rewards which can come from a developed program of good land use. The Authority, where such seems desirable, can offer financial aid to farmers in specific items of conservation work but it can never do their whole work for them. A program of publicity, education and example must therefore be basic to the Authorities' work.

It would seem that at least two things are essential to a successful soil and water conservation program

on farm lands and one of these is an understanding of the land itself. Most farmers are able to judge reasonably well the quality of their livestock, poultry and crops simply because they have a good understanding of them. There is ample reason for their being as successful in estimating the quality of their land. A development of recent years which goes a long way toward developing a more acute knowledge of the land is the land-judging contest. Several of the Conservation Authorities have sponsored or co-sponsored such contests and the results have been gratifying. Such contests may become annual affairs and it would seem logical that competition between Authorities should take place.

The other matter which appears vital to success in the conservation program is that of farm land-use planning. A good deal has been said about this already, and it remains only to add a few more remarks. One of these is that while a complete farm plan right away would be nice to have, it is not essential that this be done. The Authority cannot complete its program at once and it would be too much to expect the average farmer to do so. The essential thing is that there be a program to complete. The other remark is that even if every farm were so planned the Authorities' soil and water conservation program would not be near completion unless these plans were being implemented and unless there was some co-ordination of such effort on a watershed basis. Land drainage could be beneficial to some farmers, for instance, but should be done, if possible, from a watershed viewpoint so that the interest of all would be best served. It is hoped the map showing Recommended Land Use will be used as an aid in such planning.

There are a number of specific fields of work in which the Authority may contribute or help provide technical assistance, machinery or financial aid, or combinations of these. Brief mention of some of these fields is made below; most have been mentioned before:-

(a) Farm ponds would be an asset on many farms and the Authority may find it desirable to assist in their construction. Such assistance may be purely technical or may include a financial contribution which may be a portion of the cost to a defined maximum. The section of this report dealing with farm ponds should be read for further details.

(b) There are relatively few gullies throughout the Bighead Valley but those which exist should be dealt with. The Authority may consider offering assistance in gully rehabilitation, either on a demonstration basis, or as a matter of policy. Where such assistance is granted the Authority may wish to have the project open to the public for inspection.

(c) Gullies often have small beginnings and their development may often be prevented by the installation of grass waterways in water flow channels. Most farmers can do such work themselves but may require technical assistance. The Authority might consider supplying such assistance as is needed. Similar remarks apply to contour cultivation and strip cropping, and brush control in pastures. Many pastures are so overgrown that one often wonders what the real use of such fields is.

(d) The development of small valley projects has been discussed at length in a previous chapter but the suggestion that the Authority consider an active program in this field is reiterated here.

NORTH GREY REGION CONSERVATION REPORT

FOREST

ONTARIO DEPARTMENT OF PLANNING AND DEVELOPMENT

CONSERVATION BRANCH

CHAPTER 1

THE FOREST IN THE PAST

1. At the Time of Settlement

Good early descriptions of the forests of Southern Ontario are rare, for the early settler regarded the forest more as an obstacle to cultivation than as a positive asset worthy of recording. However, a fairly good picture may be obtained by piecing together the scattered information which does exist. Such early concern as there was with timber resources centred around pine and oak for the British navy and the easily cut softwoods for building purposes. Fuelwood was important, but was almost everywhere abundant and not worthy of special note. In addition the type of timber was of indirect interest as an indication of the quality of the land; pine - oak forests indicating light, easily-worked soil, and maple - beech stands suggesting richer but heavier soils.

In order to record this information prior to settlement, the early surveyors were instructed as follows:

> "Your field book is to be kept in the accompanying form, comprising the kind and quality of the soil and timber, entering each kind of timber in the order of its relative abundance."

In accordance with these instructions, the surveyors' notebooks included a running account of the composition of the forest cover along every line they ran, and thus they provide a reasonably accurate picture of the original bush in each township surveyed.

Collingwood and St. Vincent Townships were surveyed in 1833 and most of the other townships of the North Grey Region in the 1840's. From the surveyors' notes it is clear that they worked through a primeval forest almost unbroken except for an occasional "beaver meadow" along the streams. The "Owens Sound Settlement", according to Mr. Durnford, the crown land agent at Arthur, "was in the autumn

of 1840 a part of that interminable wilderness which lies to the Northwest of the populous districts of London and Wellington." What the surveyor, Charles Rankin, records in 1848 of the route of the "Toronto and Owen's Sound Road" applied to most of the area:

> "The timber (except the Swamps) on the whole route through is Beech, Maple, Elm & Basswood - the Swamps are cedar & Tamarack."

Unfortunately pine was scarce, although we have records of scattered pine in Derby Township, and two lots near the Pottawatomi River have their timber listed as "principally pine."

The hardwood stands must have been magnificent, but they inspired no glowing descriptions. They were simply a hindrance to road building and settlement.

2. Clearing the Land

The attitude of the early settler to the forest was completely hostile. Although the forest supplied his meagre needs for construction material and fuel, this was but a drop in a seemingly limitless sea of supply. Transportation was poor, and markets for his woodland produce extremely limited. For agriculture to develop the forest must go, and much of it was simply piled and burned. Settlement duties required a certain amount of land to be cleared before a patent could be obtained. Regulations issued in 1840 with respect to grants of land along the Garafraxa Road contained the following provision:

> "Settlers will be required to clear, and place under crop, one-third of the land located, and to reside on the land until this Settlement duty is performed."

As a new area was opened up the better land was naturally occupied first and the rough and swampy areas were avoided. Land was cleared first along the fronts of the farms and the woodland cut farther and farther back toward the end of the farm which lay farthest from the road. This was done, in many cases, without reference to the quality of the soil except where it was swampy.

REMAINING WOODLAND IN PER CENT

ESTIMATED FROM CENSUS OF CANADA FIGURES

Township	1851	1861	1891	1911	1921	1931	1941	1951
Artemesia	99	85	39	18	19	18	15	15
Collingwood	98	92	46	17	22	21	17	16
Derby	96	83	38	18	20	15	15	15
Euphrasia	97	93	38	21	18	18	15	18
Holland	96	84	39	20	21	21	21	15
Osprey	99	90	45	20	26	24	20	19
St. Vincent	92	82	27	15	16	13	15	11
Sullivan	98	91	47	20	15	13	15	16
Sydenham	92	80	38	20	21	19	16	14
Total	96	87	39	19	20	18	18	16

NOTE: The recent figures are lower than those found by actual survey, but the table shows the general trend of land clearing.

The accompanying table gives an estimate of the remaining woodland at various dates in the townships making up the the North Grey Region. Although slight irregularities appear in the table, due to incomplete information, the general trend of events is obvious. Until about 1910, the decrease in woodland was rapid. After that the small remaining area of woodland was at least tolerated, and in some cases has probably shown a slight increase.

3. Forest Products

The earliest interest in timber in Ontario was the reservation of pine and oak either by specified areas or by individual marked trees for the use of the British navy. The square timber trade, which commenced somewhat later and was carried on simultaneously with the mast trade from the eighteen-thirties, was likewise very selective as to species and quality. The forests of North Grey, lacking any quantity of pine and oak and remote from established routes of trade, gave the early settlers little opportunity to profit from such a selective market.

The lack of pine was felt at home. It was the preferred wood for cabins, as can be seen by some of those still remaining. Next to poor roads, one of the main complaints of the settlers was the lack of mills. In 1840, John Telfer, land agent at Owen Sound, had to bring lumber across the bay and, because of insufficient supplies, had to leave unfinished for the winter two of the three houses under construction as shelters for newly arrived settlers. The lack of pine no doubt contributed to the reluctance of saw-millers to invest their capital. In 1846, Richard Carney and William Boyd, making tentative enquiries about building a mill, reported from Owen Sound:

> "This place is suffering for the want of Pine Lumber, consequently many Buildings that would have been built this fall have to lie over, and others cannot be finished."

In view of the scattered occurrence of the pine, they felt they should have some special concessions as suggested in a letter to the Commissioner of Crown Lands, D. P. Papineau:

> "Honourable Sir,
>
> We have the honour to request information upon the following points, Vizt: -
>
> We have been informed that there is a quantity of Pine scattered through a number of Lots in the Township of Derby comprising about 2000 acres, not that there is that quantity of Pine, but that it is standing in Lots that will amount to that quantity of Land.
>
> We have been informed that the Land on which the Pine is situated is swampy and sandey, not likely to be of much value after the Pine is cut off, and we therefore consider that it ought to be sold lower in price than Land fit for cultivation.
>
> We have therefore to enquire whether the Government will sell the Lots on which the Pine is standing, and as the quantity will be large, whether it will be sold on time, to be paid in Instalments, and what time will be given, what the Land will be per Acre, and the proportion that will be required to be paid down.
>
> We have also to enquire if the Government will sell by private Contract, upon security being given that a Saw Mill shall be erected within a given time."

Even in 1849, Sir R. H. Bonnycastle, in "Canada and the Canadians", says:

> "Owen's Sound, being as yet buried in the Bush, cannot be visited by casual travellers, unless when an occasional steamer plies from Penetanguishene."

However, he could report,

> "two flour-mills and two sawmills are erected and in use."

By the forties the settlements on the lower lakes were already using a variety of species for construction and for manufacture of vehicles, furniture, barrels and woodenware. One might have hoped, therefore, that the fine hardwood stands cut in the process of land clearing in North Grey would have found their way to this market. Unfortunately, the lack of roads made this impossible, and the trees undoubtedly were simply piled and burned.

Potash, shipped to Britain for use in soap making and the dyeing industry, was a source of some revenue while land was being cleared. It was extracted from the ashes of hardwood trees, 60 large maple trees producing one barrel of 650 pounds. Mr. Telfer reported from Owen Sound in 1842:

> "Mr. Boyde is preparing to put up pot ash works but as there is no town lots run out that would answer that purpose at present he will be oblidged to wait till it is survayed or if could be alowed to extend a line two lots further to a creek that would answer the purpose he would commence Building"

For later dates we have the assistance of the Census of Canada. While the varying basis used for census returns at different periods makes exact comparisons difficult, some general trends can be traced quite clearly in the accompanying table. Until 1890 all pine and oak not sawn into lumber were listed as "square timber", and even as late as 1910 most species were listed as "square, waney or flattened". The peak production shown for most products is in 1880 or 1890. Soon after 1900 such products as tanbark, lathwood, masts, staves, shingles and piling drop from the list, and production of other products shows a sharp decline. The one product which has persisted throughout the record is fuelwood, which has dropped from a peak of 268,818 cords in 1880 to a low of 48,860 cords in 1950. Much of the tanbark (oak and hemlock) was probably used locally, as we have a recommendation of 1848 regarding a petition of a Mr. Kelborn for more land on the river bank at Owen Sound, that "as Hiram Kelborn is Carrying on a very extensive business in Tanning I would beg to Suggest that the prayer of his Petition be granted, as Mr. Telfer says, much of his Bark, has to be carried by water."

The addition in 1890 of fence posts, poles and railway ties reflects the development of the area. The introduction of wire fencing, the development of the telephone and the expansion of telegraph service all stimulated forest

FOREST PRODUCTS - ESTIMATED FROM CENSUS OF CANADA FIGURES

GREY COUNTY

Products	Species	Unit	1870	1880	1890	1900	1910	1920	1930	1940	1950
Pulpwood		Cords			464	235	304	707	178	412	92
Tanbark		"	960	879	3,485	1,260	206				
Lathwood		"	55	353	192						
Masts & Spars		Number	60	351	477	1	4				
Staves		"	543M	460M	986M	$3,585	$4,905				
Fence Rails		"						11,950	10,688		
Fence Posts		"			254,681	53,728	26,587	29,729	19,060		51,879
Poles		"			34,785	3,085	5,988	1,379	1,901		2,291
Railway Ties		"			215,934	33,286	23,759	18,136	6,716		
Piling		"				1,751	3,515				
Shingles		"			23,862M						
Fuel Wood		Cords	186,935	268,818	246,340	226,305	140,804	147,851	129,533	87,553	48,860
Square Timber & Logs	Ash	Cu.Ft.				25,179	640				
	Birch & Maple	"	2,300	8,247	395,923	42,104	120,962				
	Black Walnut	"		900							
	Butternut	"	126	1,525	10,000						
	Elm	"	126,692	601,247	394,303	286,204	33,142				
	Hickory	"		2,350							
	Oak	"	1,954	8,002	4,917	480					
	Pine	"	110,819	51,901	111,700	6,271	5,458				
	Tamarack	"	9,303	160,301	20,490						
	Others	"	198,779	1,326,792	148,177	45,233	40,572				
Lumber	Pine	M bd.ft.	1,391	11,004	19,520	376	258)	9,482	2,722		3,543
	Others	M bd.ft.	7,159	40,127	58,876	28,105	20,975)				
Other Products		$					241	4,462	6,240	92,271*	4,095

* Includes lumber, posts and poles

M = Thousand (1,000)

production at this period. The subsequent sharp decline in these products shows the rapid depletion of supplies.

Tamarack was an important timber until 1890 when the species was almost wiped out by the depredations of the larch saw-fly. The amount of walnut, butternut and hickory cut was never large, and after 1890 these species disappear from the record.

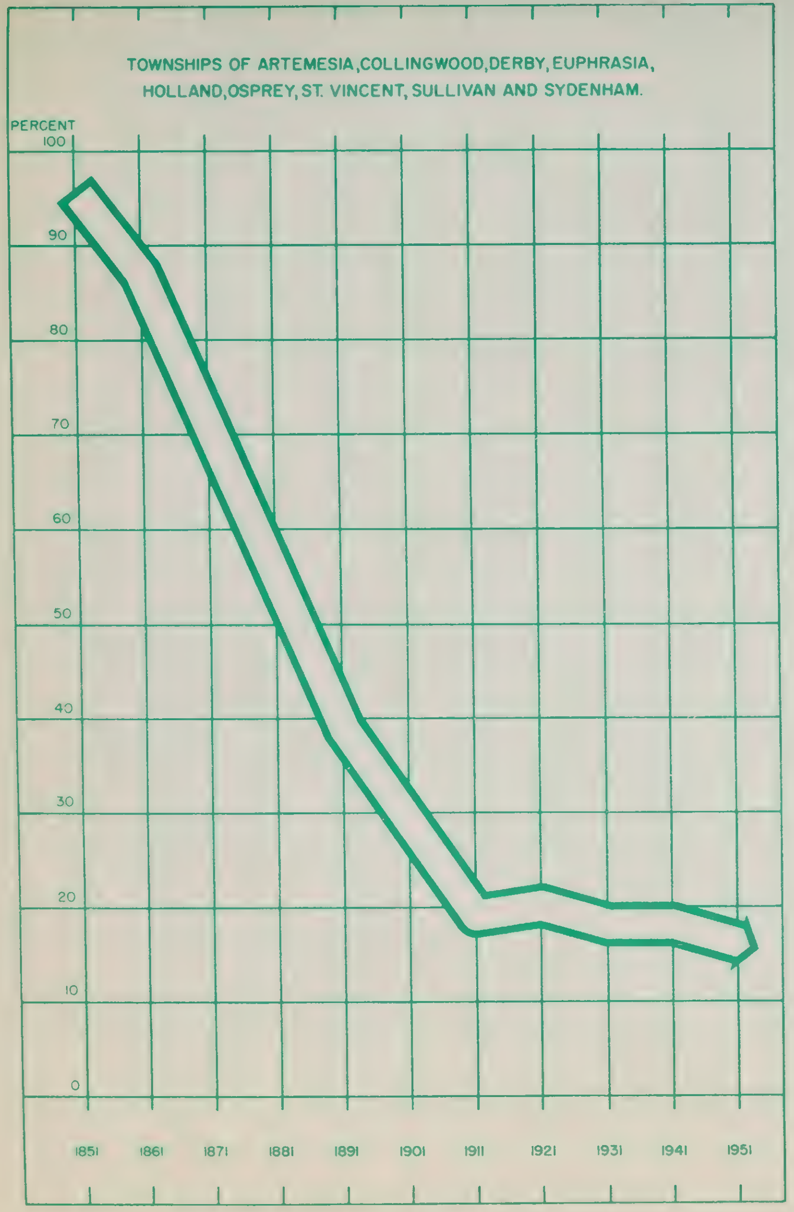
In 1920 no square timber is shown, and from this time on lumber production is small and is no longer separated by species.

Maple sugar was almost the only sugar available to the pioneers. In 1910 census records begin to list maple syrup as well, indicating the change from a pioneer necessity to a modern luxury. For the sake of comparison the following table shows these products expressed as an equivalent amount of syrup. Production in 1951 was less than 15 per cent of that for the peak year of 1871.

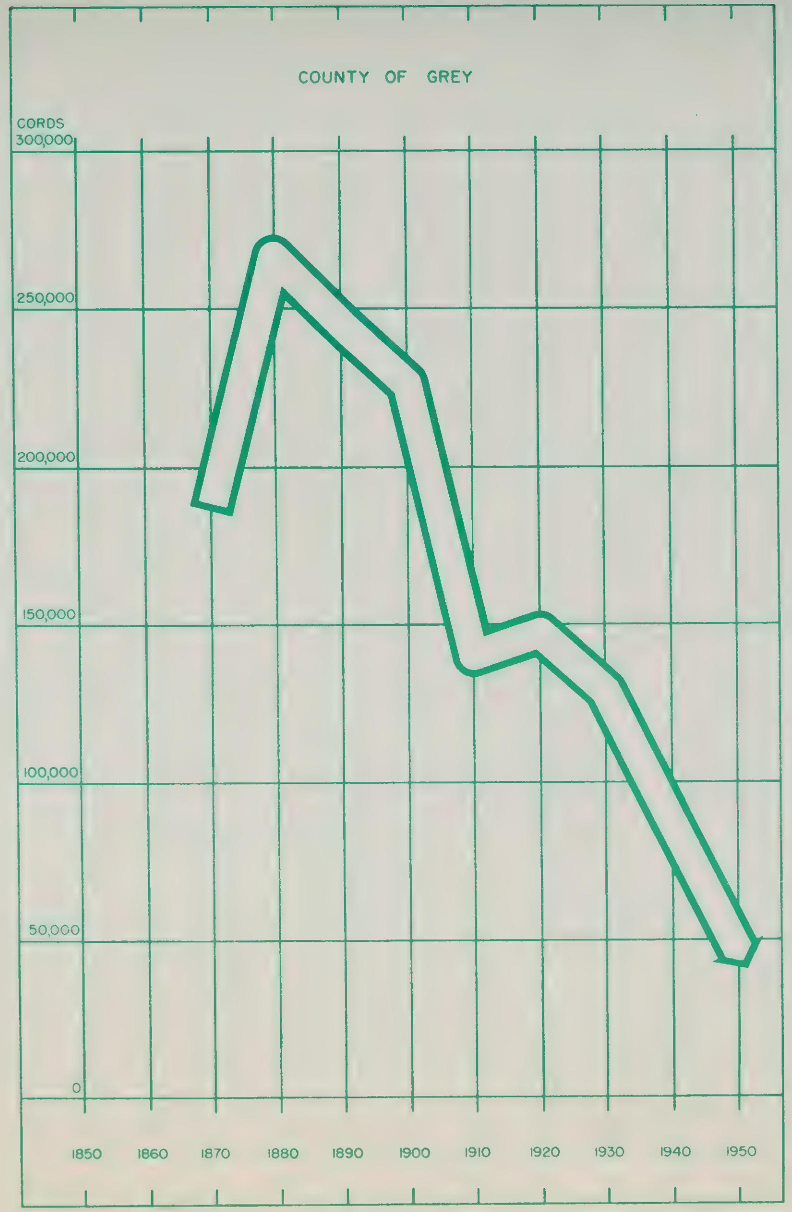
MAPLE PRODUCTS OF GREY COUNTY
CALCULATED AS SYRUP
FROM CENSUS OF CANADA FIGURES

Year	Gals.
1851	5,680
1861	19,412
1871	41,776
1881	11,043
1891	16,757
1901	5,108
1911	13,991
1921	11,449
1931	21,008
1941	6,998
1951	6,024

PER CENT WOODLAND

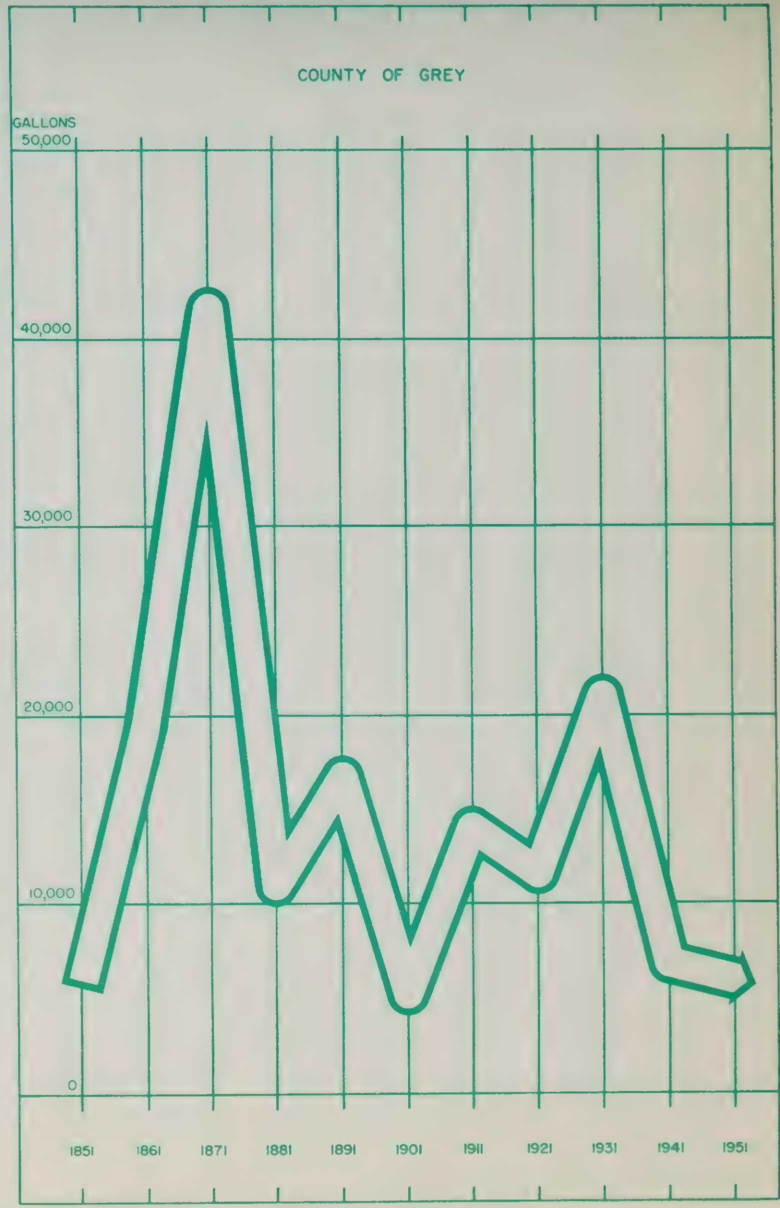


FUELWOOD PRODUCTION



MAPLE PRODUCTS

(EXPRESSED AS GALLONS OF SYRUP)



CHAPTER 2

PRESENT WOODLAND CONDITIONS

An accurate inventory of the existing woodland in the watershed and an estimate of its present condition is a basic necessity in establishing a woodland conservation program. Therefore a detailed study was made of all woodlands, scrubland, plantations and land which is suitable for reforestation.

The entire North Grey Region lies within the Huron-Ontario Section of the Great Lakes-St. Lawrence Forest Region.* In this forest section, as a whole, the prevailing association of forest trees is dominated by sugar maple and beech and this association is described as the climax type† for the area. Occurring in this climax type are other associated species such as basswood, white elm, yellow birch, white ash, hemlock and white pine. After disturbances such as cutting or fire this climax type may be replaced for a time by poplar and white birch. On local or specialized sites such as river bottoms and swamps there occur other aggregations of trees which may bear no relation to the typical or climax forest of the area; for example, an association where white cedar is the dominant species. These distinctive local combinations of tree species are in response to very local climatic, soil, topographic and drainage features.

1. Survey Methods

Aerial photographic mosaics, cut in units of about 1,000 acres, were provided to the forestry party, and mapping in the field was done directly on the mosaics. Each area of woodland, scrubland, swamp and rough land was visited

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* W. E. D. Halliday. A Forest Classification for Canada, 1937.

† The climax type is the one best suited to maintain itself permanently under the climatic conditions of a given area. Unless disturbed by fire, axe, or other agents it will eventually take possession and hold most of the area against the competition of other trees.

and described as to acreage, cover type, presence of grazing, reproduction, and average diameter at breast height.

Each woodlot was classified as hardwood, coniferous or mixed. The term "hardwood" is used to denote all broad-leaved trees regardless of their physical hardness. A woodlot in which 80 per cent or more of the trees are hardwoods is called a hardwood stand; one in which 80 per cent or more of the trees are conifers is called a coniferous stand; and all other stands are classed as mixedwood.

Plantations were likewise examined and records made of method of planting, approximate age, care, damage and survival.

Land suitable for reforestation was mapped, and descriptions prepared in some detail for the larger areas.

2. Forest Cover Types

The term "forest cover type" refers to those combinations of tree species now occupying the ground, with no implication as to whether these types are temporary or permanent. A slightly modified form of the system drawn up by the Society of American Foresters has been used on this survey so that the system will adequately describe the cover types common to the watershed. The gaps in the numerical system are due to certain cover types common to the eastern United States which do not enter Canada.

The following cover types were encountered in the North Grey Region:

Type Number	Name
1	Jack pine
4	Aspen
6	Paper birch
11	Hemlock
12	Sugar maple - beech - yellow birch
13	Sugar maple - basswood
14	Sugar maple
16	Yellow birch
21	White spruce - balsam fir - paper birch
22	Balsam fir

Hard maple is the most important upland species. It once occupied most of the better soils.

The soft maple - elm type occupies many headwater swamps.

Grazing by cattle has ruined many woodlots.

Type Number	Name
23	Black spruce
24	White cedar
25	Tamarack
26	Black ash - white elm - red maple
50	White oak
51	Red oak - basswood - white ash
57	Beech - sugar maple
58	Beech
59	Ash - hickory
60	Silver maple - white elm
60a	White elm
88	Willow

Although twenty-two cover types were identified in these watersheds, 97 per cent of the woodland acreage is contained within eight cover types. In order of the area which they occupy, these types are as follows:

Type 14 - Sugar maple, occupies 36,010 acres or 34.8 per cent of the woodland acreage. This type and the closely related Type 57 (beech - sugar maple) originally covered most of the upland or better-drained areas of the watershed, but since it occupied land which was considered fertile and with good moisture conditions much of it was cleared to make way for agriculture.

Calcareous soils are considered desirable for the vigorous growth of high-quality hard maple timber, and the upland soils of the area seem to satisfy this requirement well. Common associates of the type are white elm, white ash, basswood, black cherry, rock elm and hemlock, with butternut and yellow birch typically occurring in the lowland locations of the type.

Type 24 - White cedar, occupies 19,224 acres or 18.6 per cent of the woodland area. This type occurs most commonly on the muck soils of the swamps where it has such associates as black ash, white elm, tamarack, red maple, black spruce, yellow birch,

FOREST COVER TYPES

Township	No. of Acres	1	4	6	11	12	13	14	15	21	22	23	24	25	26	50	51	57	58	59	60	60a	88
Artemesia	9,324	-	869	24	12	-	-	2232	-	-	52	-	2922	154	4	-	-	1948	-	-	584	523	-
Collingwood	15,755	-	1253	1604	37	10	-	5926	3	-	35	6	2279	5	470	-	-	2424	22	-	95	1494	92
Derby	8,981	-	300	-	25	-	598	2929	-	9	-	-	1418	-	681	-	-	337	-	-	2096	588	-
Euphrasia	14,975	-	740	225	-	-	65	2804	-	-	103	7	2492	32	1681	-	-	4560	114	-	1147	1005	-
Holland	9,387	-	269	7	18	-	-	3211	-	-	-	-	2850	209	132	-	-	1709	-	-	423	559	-
Keppel	448	-	-	-	-	-	-	51	-	-	220	-	177	-	-	-	-	-	-	-	-	-	-
Nottawasaga	458	-	150	-	-	-	-	58	-	-	18	-	68	-	18	-	-	118	-	-	-	28	-
Osprey	9,574	-	420	42	-	46	-	4558	-	64	389	-	2275	413	119	-	-	885	-	-	80	283	-
St. Vincent	13,153	4	672	198	15	-	6	5494	-	-	-	-	1428	7	220	12	34	2404	20	101	488	2050	-
Sarawak	86	-	-	-	-	-	-	80	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-
Sullivan	2,354	-	184	-	-	-	-	566	-	-	-	10	610	-	96	-	-	550	-	-	168	170	-
Sydenham	19,008	-	503	50	68	23	-	8101	-	-	-	-	2705	-	1419	-	-	2454	21	-	1619	2045	-
TOTAL	103,503	4	5360	2150	175	79	669	36010	3	73	817	23	19224	820	4840	12	34	17389	177	101	6700	8751	92
PER CENT		0.0	5.2	2.0	0.2	0.1	0.6	34.8	0.0	0.1	0.8	0.0	18.6	0.8	4.6	0.0	0.0	16.8	0.2	0.1	6.5	8.5	0.1

FOREST COVER TYPES BY WATERSHEDS
1957

hemlock, white pine and and white birch. Where lime is plentiful white cedar may extend even to the droughty upland slopes where it tends to form pure stands.

Type 57 - Beech - sugar maple, occupies 17,389 acres or 16.8 per cent of the woodland area. This is regarded as the typical association forming the climax type for the uplands of the region. Its associates are hemlock, white elm, basswood, white ash and black cherry, with hornbeam an important subordinate. The type, like Type 14 (sugar maple) was formerly very extensive in the area but, because it occupied the best land, its area has been considerably depleted.

Type 60a - White elm, occupied 8.5 per cent of the woodland area. Type 60a is very similar to the silver maple - white elm swamp type, but often occurs on somewhat drier sites.

Type 60 - Silver maple - white elm, is a type of poorly drained soils unsuitable for general farming unless completely and adequately underdrained; for this reason it and the similar white elm Type 60a have survived better than forest cover types on better-drained land. Associated species are red maple, slippery elm, white ash, bur oak and bitternut hickory. It occupies 6.5 per cent of the woodland area of the North Grey Region.

Type 4 - Aspen, occupies 5.2 per cent of the woodland acreage. Aspen is a pioneer type coming in after clear-cut operations, over-grazing or fire. It quite frequently is the invasion species on abandoned fields and pastures. Though it avoids the wettest swamps it does grow on soils that are wet throughout a good part of the year, and occurs as well on the

- droughty soils. Its associates may be large-toothed aspen, balsam poplar, red cherry, white elm and paper birch. An understory of dogwood or of spruce and balsam fir on the wet sites, or of tolerant hardwoods on the drier sites, is frequently present.

Type 26 - Black ash - white elm - red maple, makes up 4.6 per cent of the woodlands. This type occupies moist to wet muck or peat soils in swamps, depressions of slow drainage and elongated areas along small sluggish streams, and often covers extensive swamps. Its associates are balsam fir, balsam poplar, yellow birch, white cedar and sometimes tamarack, white pine, basswood and hard maple.

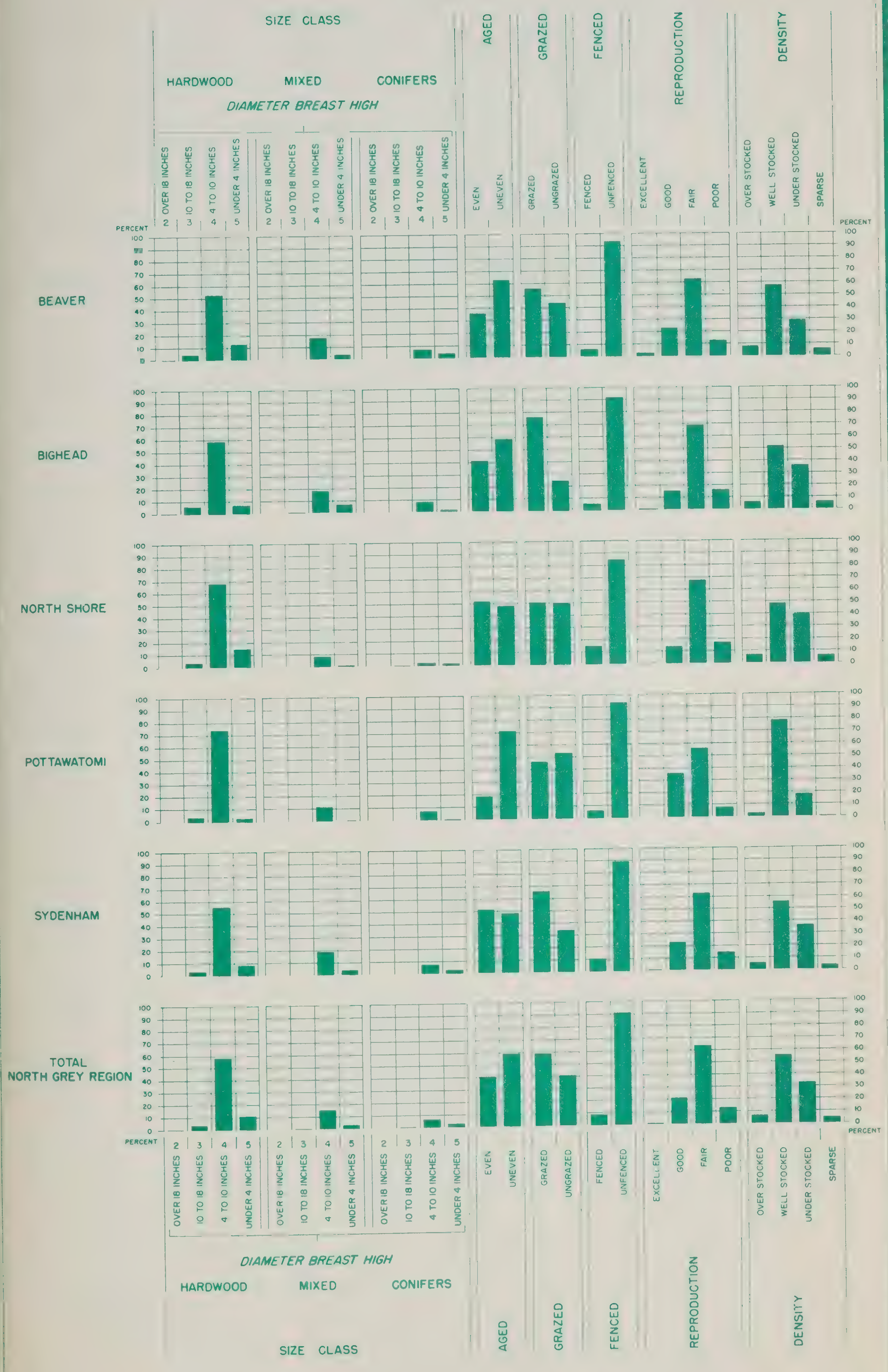
Type 6 - Paper birch, occupies 2.0 per cent of the woodland area. Like aspen, it is a pioneer type after clear-cutting or fire.

The remaining 14 cover types each occupy less than 1 per cent of the woodland and some occur only in trace amounts of three or four acres, as shown on the accompanying table of forest cover types.

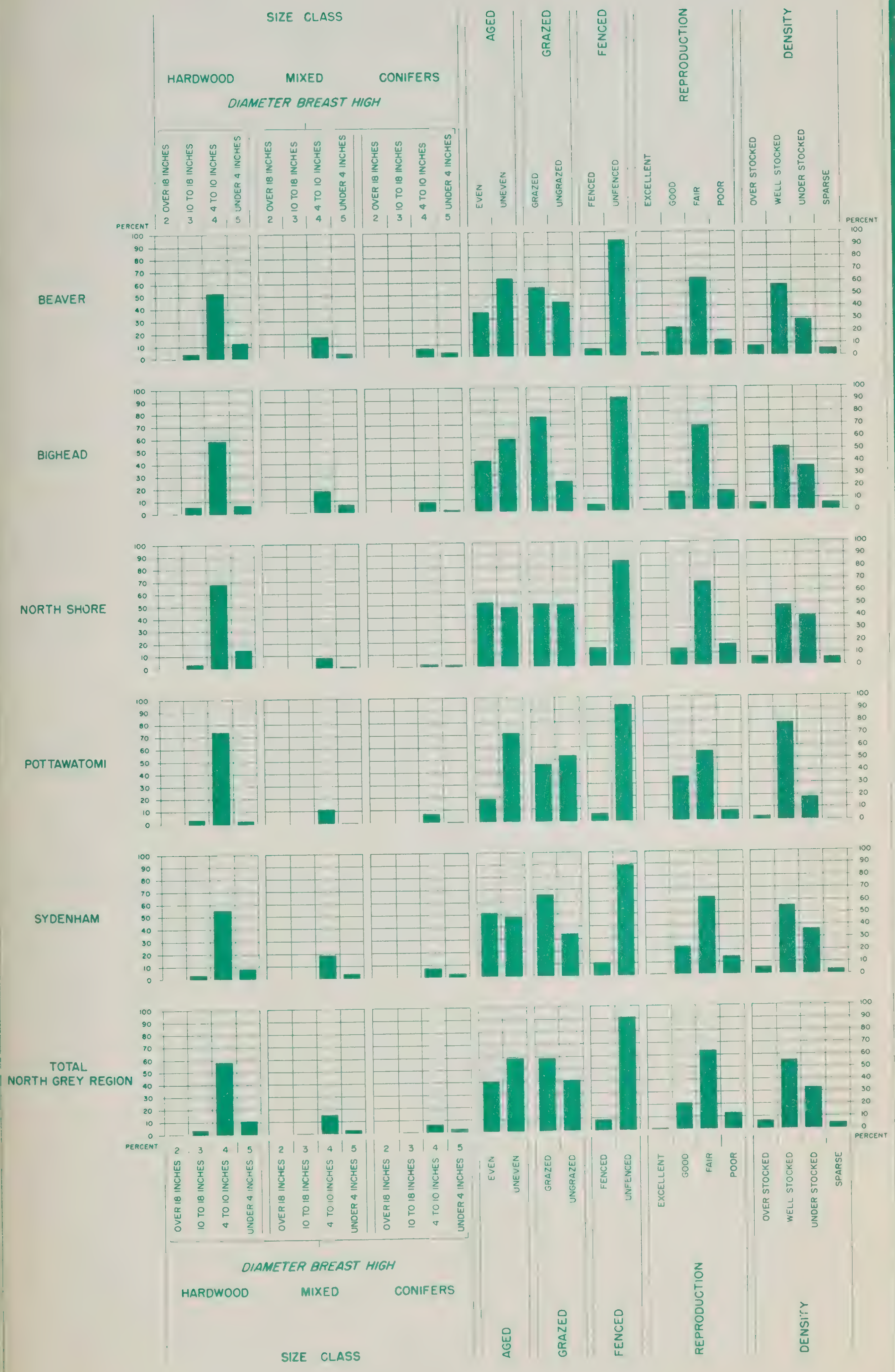
Summary of Cover Types

(a) The upland areas of the North Grey Region are characterized by sugar maple and beech - sugar maple stands which are the common climax type for the Great Lakes - St. Lawrence Forest Region. These types make up 51.6 per cent of the total woodland of the watershed. These cover types once extended over most of the upland areas. As they occupied the most desirable agricultural land, a large proportion of these stands was cleared.

WOODLAND CONDITIONS BY WATERSHEDS
1957



WOODLAND CONDITIONS BY WATERSHEDS
1957



(b) The other common types are mainly those characteristic of swamp areas which were less affected by land clearing. White cedar, elm, soft maple and black ash produce a forest crop on lands not suited for other use, and at the same time form valuable water storage areas.

(c) Aspen and paper birch, which are temporary types of relatively low commercial value, now occupy 7.2 per cent of the woodland area due to clear-cutting or other opening up of the forest. Much of this area could be occupied by more valuable forest species.

3. Condition of Woodlands

Conditions revealed by the survey are shown in some detail in the accompanying graph.

Natural woodland within the watersheds comprises 103,503 acres, which is 24.9 per cent of the total area of 418,880 acres. Of this woodland, 73.0 per cent is classed as hardwood stands, 18.2 per cent as mixedwood, and only 8.8 per cent as coniferous. This indicates that even the cedar type has a considerable admixture of swamp hardwoods. As upland conifers and mixedwood types are extremely limited, the supply of softwood sawlogs from the area is very small.

Very little of the present woodland is mature and merchantable, although stands assigned to the smaller classes may have some merchantable trees in them. The hardwoods over 10 inches diameter breast height (4.1 per cent) and the mixedwood and conifers over 4 inches (21.9 per cent) will soon reach maturity and should pay for proper management in a relatively short time. The 15.8 per cent of young stands, under 4 inches diameter breast height, and the 58.2 per cent of hardwoods between 4 and 10 inches will require some time to grow to merchantable size. This time may be shortened by thinning the stands where necessary.

The survey indicates that 59.2 per cent of the woodland is uneven-aged, and therefore might readily become a source of continuous revenue to the owner as there will be some trees maturing every few years. However, in many woodlots this continuous production will not last for long unless there is an improvement in natural regeneration. Thirteen per cent of the woodland area shows virtually no regeneration and, for another sixty-four per cent, regeneration is somewhat better but still poor. Even the older part of the stand is understocked to sparse in nearly thirty-eight per cent of the woodland. One obvious reason for this condition is the fact that over half the woodlots are grazed.

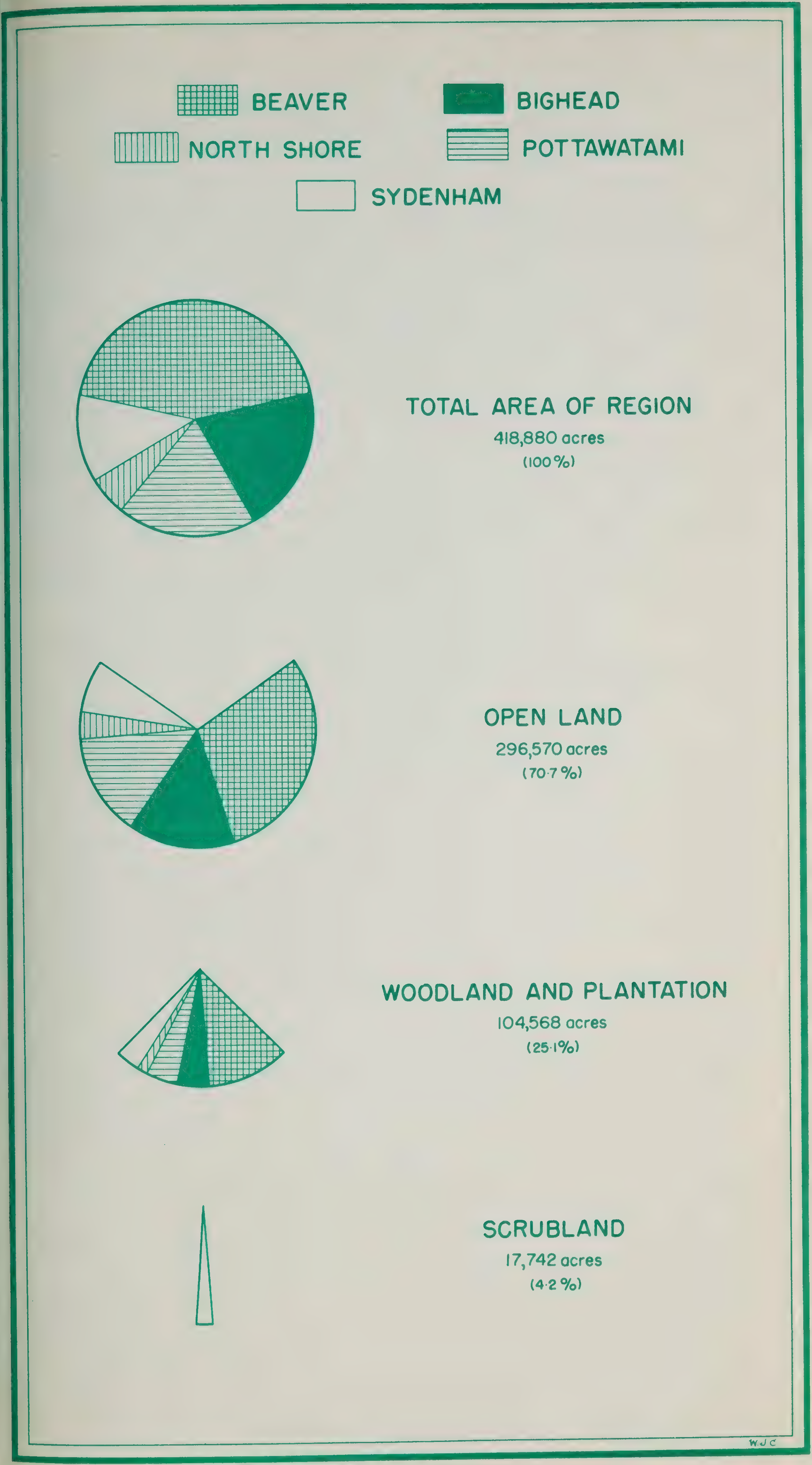
4. Scrublands

In all, 17,760 acres in the watershed are covered with tree species which never attain commercial size. The most common species are scrub willow and dogwood on poorly drained sites and hawthorn and sumach on dry sites. Much of this area is located on abandoned farmland or neglected pasture.

In some cases this land can be restored through drainage or through eradication of dry scrub. However, where such restoration does not seem economically feasible, the area should be returned to tree cover through systematic replacement of the scrub species with more valuable species.

SCRUBLANDS

Township	Area in Watershed (Acres)	Dry (Acres)	Scrub		
			Wet (Acres)	Total (Acres)	Total % of Twp. Area
Artemesia	32,639	124	597	721	2.2
Collingwood	59,519	1,412	230	1,642	2.8
Derby	29,298	848	579	1,427	4.9
Euphrasia	59,732	1,426	891	2,317	3.9
Holland	32,935	731	636	1,367	4.1
Keppel	1,251	32	87	119	9.5
Nottawasaga	1,026	32	50	82	8.0
Osprey	35,360	518	457	975	2.8
St. Vincent (+Meaford)	68,823	2,617	249	2,866	4.1
Sarawak	986	25	8	33	3.3
Sullivan	13,740	389	1,043	1,432	10.4
Sydenham (+Owen Sound)	83,571	3,382	1,397	4,779	5.7
Total	418,880	11,536	6,224	17,760	4.2



LAND CLASSIFICATION - TOTAL WATERSHEDS

CHAPTER 3

FOREST CONSERVATION MEASURES IN PROGRESS

1. County Forests

Many counties have established forests under agreements similar to those described later for the Conservation Authorities. The County of Grey has been one of the most active. The county has acquired over seven thousand acres, of which about 2,600 acres are in the territory of the North Grey Authority. Some of the plantations in the North Grey Region are now over ten years old and some at the Main Tract near Durham are over twenty years old and ready to start producing revenue from thinnings.

2. Municipal Forests and School Forests

Municipal forests are areas owned and managed by municipalities other than counties. The City of Owen Sound has a small plantation west of the bay which screens a residential district from the dock and factory area. Starting in 1934, the Owen Sound Public Utilities Commission in four years planted 161,500 trees on its 180-acre tract at Inglis Falls. From now on this tract will not only protect the city water supply, but will provide an increasing source of revenue.

In the Robertson Forestry Plot, planted in 1947, the Township of St. Vincent has a four-acre plot received as a gift, which demonstrates what can be done with a rough hillside cut off by a road diversion.

The Rockford Public School has also been fortunate in receiving a gift of a twenty-eight acre tract on Highway No. 6 just south of Owen Sound. This plot has served as a demonstration of reforestation and, properly used, could continue to give the children valuable instruction and practice in forest management.

3. Private Planting

There are in the North Grey Region only 515 acres of private plantation. The region lacks the extensive, easily planted sand plains which stimulated early action on reforestation in other parts of southern Ontario. Perhaps the presence of considerable natural woodland led to a feeling that reforestation was not urgently needed. In any case, private planting was slow to get a start and it is only in the past decade that real progress has been shown. The total area of private plantation established by various dates is shown below.

Present Plantations Established by	Area (Acres)
1927	2
1937	75
1947	133
1957	515

Private individuals and municipalities may obtain advice and assistance in reforestation and woodlot management through the Department of Lands and Forests' Zone Forester at Owen Sound. The Zone Forester also assists in the establishment of Authority forests, county forests, demonstration and school plots.

4. Demonstration Woodlots

The most important measure which could be taken for forest conservation would be the improved management of present woodlots. An early effort in this direction was the establishment by the Department of Lands and Forests of demonstration woodlots. These are areas of private woodland on which the owners have agreed to follow prescribed methods of woodlot management and to permit access to the area by interested persons. A number of demonstration woodlots were established in the North Grey Region, and no doubt have exerted an influence for proper management in the surrounding area.

5. Tree Farms

In the past few years a movement has been under way to recognize well-managed forest properties as Certified Tree Farms. With the sponsorship of several organizations interested in better forestry, the Canadian Forestry Association in 1953 formed a National Tree Farm Committee to recognize with a suitable sign and certificate those owners who agree to maintain their land for growing forest crops, protect the land adequately, agree that cutting practices will be satisfactory to ensure future forest crops, and permit inspection by Committee foresters.

In the North Grey Region, the Knechtel Tree Farm of 260 acres in Holland Township shows what can be done by a forward-looking member of the wood-using industry. Here experimental plantations of fast-growing poplar hybrids are being tried and the fine hardwood bush is being moderately cut to ensure better growth and a continual future yield of woodland products.

Several Conservation Authorities have become co-sponsors of the Tree Farm movement in their areas. It is recommended that the North Grey Region Authority give similar support to this movement.

6. Tree-Cutting By-laws

Under The Trees Conservation Act of 1946 and its successor The Trees Act (R.S.O. 1950, c.399) twenty-three counties have passed by-laws to restrict and regulate the cutting of trees. These by-laws do not interfere with the right of the owner to cut material for his own domestic use, but specify certain diameters below which trees may not be cut for sale.

The Grey County by-law establishes the following minimum stump diameters for material cut for sale:

Cedar, poplar, birch	8 inches
White ash, basswood, oak, rock elm, hard maple, red and white pines	14 "
All other species	12 "

Such diameter limits are only an elementary step to prevent indiscriminate slashing of woodlands. Where these by-laws have been enforced rigidly they have proved of considerable benefit. There will, however, usually be fast-growing trees above the diameter limit which are increasing rapidly in value, and should be left for future cutting. There will also be poorly formed or diseased trees below the diameter limit which should be removed.

Better than a rigid diameter limit is the marking of trees for cutting according to their condition. Professional advice on such marking is available through the Zone Forester. Many tree-cutting by-laws, including that of Grey County, provide for the necessary variations from a strict diameter limit where the cutting is done under such supervision and in accordance with good forestry practice.

7. Tax Concessions

As early as 1908 the Ontario Legislature provided an exemption of one acre used for forestry purposes for every ten acres of a farm. In those townships where exemptions have been granted freely when conditions were met, and cancelled promptly when woodlots were abused, this provision has been a real help in drawing attention to proper woodlot care. Elsewhere, exemptions have been granted grudgingly, if at all, and have accomplished nothing.

Perhaps more important than exemptions are the provisions now in the Assessment Act whereby land only shall be assessed, and not the timber on it; and the land should be assessed the same whether it is left as slash land or covered with good bush. Section 33 of the Assessment Act contains the following provisions:

"(12) Land which has been planted for forestation or reforestation purposes shall not be assessed at a greater value by reason only of such planting,"

"(13) Land used as woodlands shall not be assessed at a greater value by reason of the presence of the trees thereon nor shall it be assessed at a lesser value by reason of the removal of the trees."

This cannot rightly be called a tax "concession". It is simply a recognition of the fact that trees are a crop, and as such are not taxable. Some assessors have accepted this principle grudgingly. We still have instances of woodlands, well-managed by individuals or by industry, being assessed two or three times as much as neighbouring woodlots neglected by their owners. It is recommended that the Authority urge its member municipalities to apply the Assessment Act so as to encourage the best management of their woodlands.

8. <u>4-H Clubs</u>

These clubs are organized by the Ontario Department of Agriculture assisted by the Department of Lands and Forests and must be sponsored by an organization interested in the improvement of woodland and reforestation.

Members must be between 12 and 21 years of age and each member undertakes a project such as marking a half-acre plot of woodland for thinning or reforesting a quarter-acre of land. Projects are judged annually on Achievement Day and prizes awarded; for this purpose the Department of Agriculture furnishes $3.00 per member and the sponsoring organization $1.50. Winners may enter the Provincial Inter-Forestry-Club Competition.

At present there are two clubs operating at Meaford High School and one at Thornbury High School. Sponsorship of such clubs would be a worthwhile project for the Authority.

CHAPTER 4

SOME FOREST CONSERVATION MEASURES REQUIRED

The activities through which the Authority may further forest conservation fall into three broad categories. In woodlot improvement demonstrations or private planting the Authority may co-operate with private landowners. In larger areas needing reforestation or management the Authority may acquire land and manage it directly. Through public meetings, field days and publications the Authority may educate and encourage residents of the North Grey Region to practise conservation on their own lands.

1. North Grey Authority Forest

One of the most important conservation measures required in the North Grey Region is the establishment by the Conservation Authority of forest areas which will serve to protect the natural water-storage areas of the valley and will revive or maintain the productivity of areas which would otherwise be neglected.

Fourteen Conservation Authorities have now entered into agreements with the Ontario Government for the establishment and management of Authority forests. The Province advances half the cost of the land and, in some cases, where it is necessary or desirable to include merchantable timber, the Province also assumes the cost of the merchantable timber. These agreements run for a period of 50 years, during which time the Ontario Government agrees to establish the forest and pay the cost of such items as fencing, buildings, equipment, labour, maintenance, trees, etc. - in short, everything connected with the management of the forest.

At the end of the 50-year period the Authority may exercise any one of three options: first, to take the forest over from the Government and pay back the cost of

establishment and maintenance without interest; <u>second</u>, to relinquish all claim to the forest, whereupon the Government will pay to the Authority the balance of the land cost without interest; <u>third</u>, the forest may be carried on as a joint undertaking by the Province and the Authority, each sharing half of the cost and half of the profits. Authority lands are subject to municipal taxes. A number of areas suitable for this purpose have been defined, mainly at the headwaters of the streams within the Authority area. The nature and distribution of these areas by townships are shown in the accompanying table.

In all, 55,667 acres are recommended for acquisition by the North Grey Region Conservation Authority. Of this total 13,615 acres are open lands, 38,000 acres have some form of tree cover, and 3,856 acres are covered with scrub growth. The nature of the land recommended may be seen from a general description of the main areas concerned.

(a) <u>Collingwood-Flesherton</u>

Through this section we have a complex mixture of limestone plain and glacial moraines. Where morainic deposits are lacking, the soil over the limestone bedrock is thin and droughty. In the moraines rough slopes and an admixture of stones and boulders limit or prevent successful agriculture. In the hollows drainage is poor and swamps develop.

(b) <u>Feversham</u>

East of Feversham and extending toward Singhampton is a smaller stretch of moraine containing some of the headwaters of the Beaver River.

(c) <u>Craigleith</u>

This is mainly a piece of the escarpment with steep slopes and thin soils.

(d) <u>Meaford Creek</u>

East of Griersville, covering the headwaters of Meaford Creek and East Meaford Creek, is an area of highly

erosible clay land. Gullies are spreading and this land should be returned to tree cover.

(e) Walters Falls

East and south of Walters Falls and west to Williams Lake is another stretch of rough, stony moraine in which arise many tributaries of the Bighead River and the Sydenham.

(f) Woodford - Chatsworth

This major section contains the same mixture as the first block; limestone plain and moraine, thin soils and deeper, rough bouldery soils with swampy depressions. It is the source of many tributaries of the Sydenham, the Bighead and the smaller streams flowing north-west to the Sound.

(g) Derby

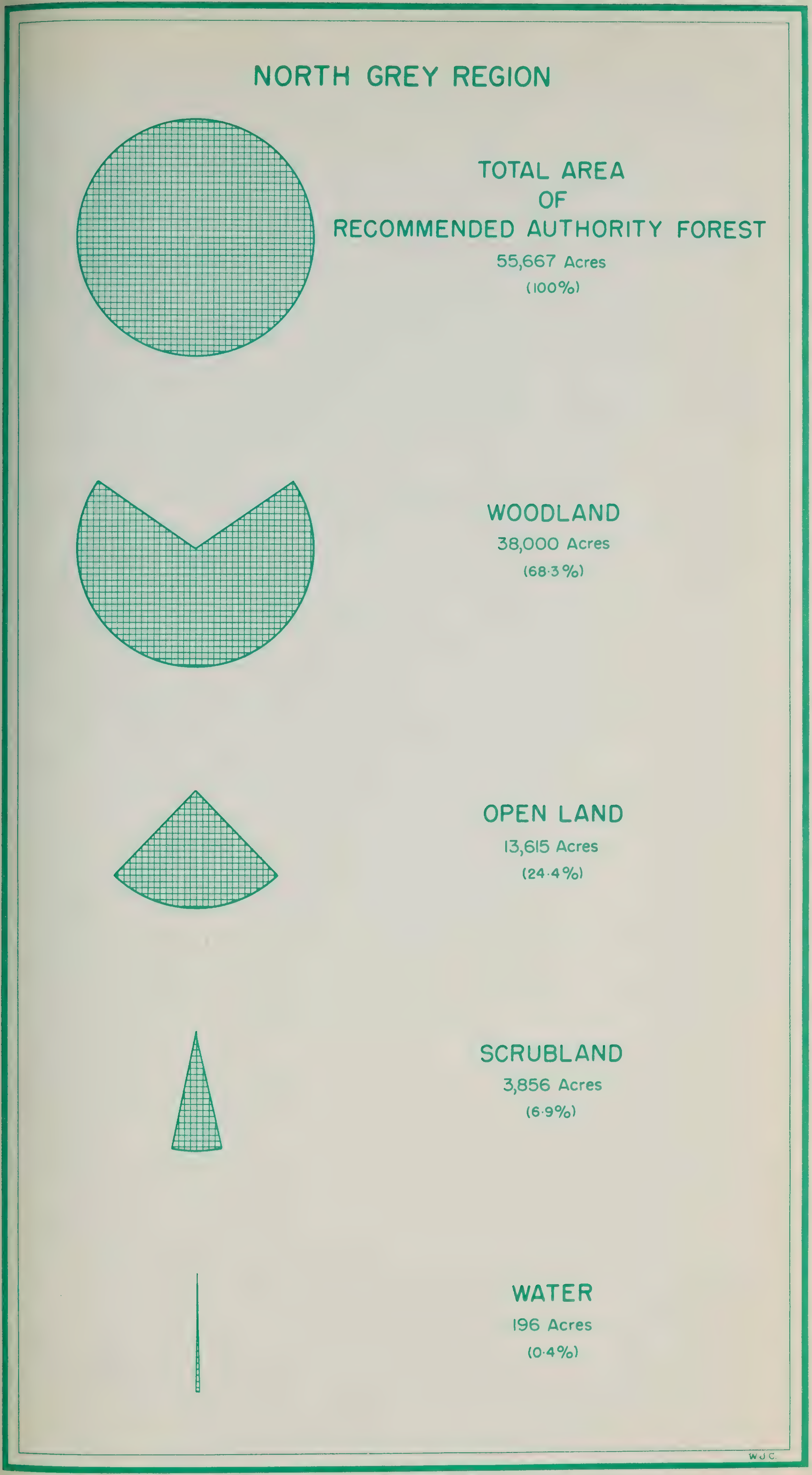
Along the Pottawatomi River and in the depressions between the whaleback hills (drumlins) near Jackson are extensive swampy areas which are recommended as Authority Forest to protect the source of the river.

(h) Shoreline

The stony former beach lines south of Leith and the steep shore cliff west of Balaclava should both be retained in tree cover and are recommended for acquisition by the Authority.

RECOMMENDED AUTHORITY FOREST - ACRES

Township	Woodland	Open	Scrub	Water	Total
Artemesia	4,151	2,242	57	-	6,450
Collingwood	8,305	2,708	414	30	11,457
Derby	2,551	387	451	-	3,389
Euphrasia	4,842	1,516	622	10	6,990
Holland	3,564	1,779	468	94	5,905
Keppel	401	44	30	-	475
Nottawasaga	207	74	6	-	287
Osprey	2,957	1,074	106	12	4,149
St. Vincent	1,550	427	180	-	2,157
Sullivan	401	217	222	-	840
Sydenham	9,071	3,147	1,300	50	13,568
Total	38,000	13,615	3,856	196	55,667
Percentage	68.3%	24.4%	6.9%	0.4%	100%



LAND CLASSIFICATION
RECOMMENDED AUTHORITY FOREST

A minimum of land in the better classes has been recommended for reforestation. However, it was impossible to omit such land entirely when it formed a small part of a lot which was composed mainly of a poorer type of soil. In the few cases where these lands are already being well managed by private owners, there is no urgency for public acquisition. Even here, however, the Authority must be alert to see that a change in circumstances does not allow these lands to fall into other hands in which their usefulness for conservation purposes might be destroyed. It is for this reason that these few properties are included in the recommended areas.

The problem of land acquisition should be approached carefully. In most cases purchase will be arranged by direct negotiation. The Authority should also be alert to acquire tax-delinquent lands. The Authority has the power to expropriate land and is justified in doing so when an unreasonable attitude on the part of the owner stands in the way of works urgently required for the general good. However, a favourable public attitude is essential to the furtherance of conservation, and such powers must be used with discretion. Very few of the recommended properties are occupied. In an exceptional case, if a hardship would be entailed by asking an old resident to move, some special provision such as a life tenancy of the house might be arranged.

2. Private Reforestation

On many farms, even in good farming areas, there are small tracts which, because of steep slopes, poor drainage or severe erosion danger, would be better in tree cover. These tracts are not suitable for public acquisition and management, but the effect of reforestation on control of run-off, improved summer stream flow and stabilization of wood-using industry justifies public assistance in such work. These areas have not been privately reforested heretofore because the owner has

some other minor use for the area, because he is discouraged by the long period between planting and harvest of a forest crop or more commonly simply because of inertia on his part. The interest of private owners in reforestation may be fostered in several ways. Public education, such as that now carried out by the Zone Forester in the district, can be furthered by the Authority. In addition, direct assistance to private planting can be given. Several other Conservation Authorities have purchased tree-planters which supply a planting service to private owners at a nominal cost. Where rough ground makes hand planting necessary, some Authorities pay a direct cash subsidy if inspection shows that planting has been done carefully and the plantation is adequately protected from livestock.

It is the policy of the Department of Lands and Forests to charge $14 per thousand for Scotch pine and $10 per thousand for other planting stock. For some years trees were distributed free. Following the end of the war in 1945, the nurseries were unable to meet the greatly increased demand, and it was felt that a charge for trees would ensure more care in ordering the required amount and in planting the trees received. The assistance schemes carried out by other Authorities have stimulated interest in private reforestation while still ensuring the good use of the planting stock. It is recommended that the North Grey Region Conservation Authority adopt some similar policy of assistance to private reforestation.

In order to direct the efforts of the Authority and give it some idea of the extent of the task, the more obvious areas of this type were mapped during the survey as listed below.

Land too stony for agriculture would be better back in trees.

Wet pasture is soon invaded by willow scrub. This land should either be improved for agriculture or returned to forest.

This headwater swamp in the Authority forest will aid in regulating stream flow.

Township	Acres
Artemesia	386
Collingwood	244
Derby	196
Euphrasia	314
Holland	492
Nottawasaga	88
Osprey	206
St. Vincent	866
Sullivan	66
Sydenham	860
Total	3,718

3. Woodlot Improvement Projects

For most persons the best lesson in conservation is field observation of specific examples of the present abuses and efforts to remedy them. Woodlots chosen as illustrations must be near good roads and should be marked with large signs giving considerable detail of conditions and improvement measures in progress. Roadside or other parking facilities would have to be provided so that visitors could take the full time necessary for inspection without interfering with other traffic.

Some of the proposed improvements are experimental in nature. From the owner's point of view the whole program may seem to be of unproved value. On these sample areas the Conservation Authority is therefore fully justified in assuming part of the actual woodlot improvement cost as well as the cost of signs and parking facilities.

To use a private woodlot in this way for educational purposes would require a definite agreement with the owner to ensure that the proposed improvements were carried out, and that the benefits of this work would not be lost by a change of ownership or of attitude on the owner's part. In addition a detailed record of costs and returns would be necessary to show other owners that it would pay for them to adopt similar practices in their own woodlots.

Some owners may be willing to see their woodlots used for such demonstrations, but wish to be relieved of any personal participation in the project. In such cases the Authority might lease the woodlot or purchase it outright.

Below are listed several examples of well-located woodlots suitable for Authority woodlot improvement projects. The Conservation Authority should decide on suitable forms of agreements, leases, etc., explain the purpose of these projects to the owners and try to enlist them as co-operators. This list is by no means exhaustive, but serves to illustrate the type of woodlot suitable for such projects.

(1) Lot 9, Concession VIII, Derby
1 mile west of Kilsyth

A young dense beech - sugar maple stand with a mixture of basswood, ash and cherry. Overcrowding will soon slow down growth. Would benefit by removal of a few hornbeam and poor trees of other species, with additional thinning a few years later.

(2) Lot 24, Concession V, Sydenham
4 miles east of Annan

A hard maple stand with a considerable mixture of other species. The woodlot lacks regeneration due to pasturing and the stand occurs too much in clumps. Needs fencing to exclude cattle and thinning of coppice and other clumps to favour the best stems and species such as basswood and hard maple.

(3) Lot 16, Concession X, St. Vincent
4 miles west of Meaford

The main problem is too many beech, some of which are large branching wolf trees. Needs removal or girdling of these beech and some ironwood to favour maple and basswood regeneration. Fencing against grazing is also required.

(4) Lot 3, Concession V, Sullivan
4 miles north-east of Desboro

A rather better than average hard maple stand with a considerable number of pole-sized maples and a fair understory of young trees, but no regeneration because of recent grazing. It should be fenced to prevent grazing and needs the ironwood and poorly-shaped hard maple removed.

(5) Lot 3, Concession VI, Holland
5 miles east of Chatsworth

A young hard maple stand with some ash and basswood. The trees have good form but the stand lacks regeneration due to heavy grazing. The woodlot should be fenced and the grassy portion along the road scarified to encourage hard maple seeding in. Ironwood and other unwanted trees should be removed or girdled to encourage better species.

(6) Lot 24, Concession IX, Euphrasia
2 miles south of Blantyre

A heavily grazed beech - hard maple stand. It needs fencing and planting of the open area along the road. After regeneration becomes established, some beech, ironwood and the poorer maple should be removed.

(7) Lot 14, Concession XII, Collingwood
1 mile west of Red Wing

This woodlot is mainly hard maple, heavily grazed and completely lacking in regeneration. It needs fencing on the south side, removal of a few large, poor quality maple and scarification of the grassy spots so that seeds from the better trees may seed in the area.

(8) Lot 20, Concession 1 NDR, Artemesia
1 mile south-west of Ceylon

A fairly good beech - hard maple stand, of polewood size, not heavily pastured but with some understocking in both polewood and younger stems. It needs to be kept entirely free from grazing. As the stand thickens, hornbeam and other undesirable trees should be removed to avoid competition with the better hard maple.

(9) Lot 6, Concession V, Osprey
2 miles south-west of Maxwell

This hard maple stand has been moderately cut over. The remaining main stand has some diseased or poorly formed trees which should be removed as soon as large enough to be merchantable. The young growth has a large proportion of beech and ironwood which should be removed where it competes with maple. Grazing should be excluded to increase the regeneration and the open south part near the road needs scarification to encourage the seeding in of maple.

4. Forest Research

Detailed scientific research is the task of universities or government departments with greater research facilities than are available to a Conservation Authority. Large-scale application of proven methods is the task of private owners or of the Department of Lands and Forests in managing Authority Forests. Between these two extremes, however, there are many possibilities for small-scale investigations which are urgently needed and which the Authority might encourage on its own land or on private land under agreement. Determination of the best planting methods on difficult sites such as valley slopes, comparison of growth in different plantation mixtures, investigation of the value and cost of cultivation in plantations and the actual improvement in woodlots following thinnings or other treatment are all projects which would guide the people of the watershed in managing their own plantations and woodlots. The Authority should encourage such investigations and co-operate with the Department of Lands and Forests in carrying them out.

5. The Authority and Conservation Education

Many agencies at present do, or can, engage in conservation education. The Authority can supply opportunitie and materials to encourage and enlarge these activities. Wall

maps, literature, conservation pictures and conservation lectures supplied to the schools will help to give geography, history and conservation practices a local significance. Building up a library of slides on local conservation problems and accomplishments would be of great assistance to speakers. Organization of public meetings and contact with individuals and groups such as farm forums will gain support for both private and public conservation efforts. Landowners should be encouraged to make greater use of the services available from the Conservation Authority and from officers of the Department of Lands and Forests and the Department of Agriculture.

The most effective educational activity is actual participation in or field observation of conservation projects. Tree planting days, group visits to woodlot improvement projects and conducted tours over a well organized conservation trail could all be sponsored by the Conservation Authority. These activities would all stimulate individual action on forest conservation measures, such as those described in the following chapter, which cannot be carried out directly by the Authority.

CHAPTER 5

FURTHER CONSERVATION MEASURES REQUIRED

1. Woodland Management

The woodlot inventory shows that there are 103,503 acres of natural woodland in the North Grey Region. Practically all of this area requires better management. While experimentation is desirable to determine the best method of handling certain problems, the general principles of woodlot management have been known for years but have not been applied. A free advisory service is available from the Zone Foresters, but is not sufficiently used, and a readily-understood pamphlet on "The Farm Woodlot" can be obtained from the Department of Lands and Forests.

One of the most difficult problems confronting the private owner in the management of his woodland is the utilization of the small woodland products which can be readily made and handled by the owner. These products such as fuelwood, pulpwood, bolts, posts and poles, if properly harvested, increase the productivity of the woodlot and the gross returns per acre. The volume of these small products thrown on the market has been reduced by diameter limit regulations which have restricted the wholesale commercial slashing of woodlots. Nevertheless, much material of this type could still be produced from thinnings and improvement cuttings and from limbs and tops of trees. The difficulty of marketing such low-grade material has seriously hampered owners in carrying out the needed improvement work in their woodlots. Any means which can be discovered for using small and poor-grade wood should be developed to the fullest extent. At the present time interest is increasing in the possibility of manufacturing wood chips in the woodlot by means of a portable chipper. Such chips can be used for the manufacture of pulp for paper, and as cattle bedding and chicken litter, which can subsequently be spread on fields to increase the humus content of the soil. They can be made from any species of wood, and tops and branches can be utilized. The number

of pulp companies which can use hardwoods is limited at the present time and only those making kraft paper can use chips containing bark, but the demand for hardwood chips will increase and portable barkers are being developed. Every woodlot owner should consider the possibility of improving the quality of his woodlot by utilizing the low-grade material as chips or otherwise.

Owners of large woodlots might be encouraged to undertake thinnings and improvement cuttings if equipment or trained crews were available at reasonable cost. The Authority should consider offering such a service. As an alternative, the Authority might offer a subsidy for each acre improved to its specifications and found satisfactory on inspection by the Authority's officers.

2. Elimination of Woodland Grazing

The Report of the Ontario Royal Commission on Forestry, 1947, contains the following statement:

> "The most widespread abuse of forests is that of utilizing them as pasturage for animals. If this practice alone could be eliminated more than half the battle to save Ontario woodlots would be won. Forestry and pasturage cannot succeed on the same piece of ground, as diametrically opposite conditions are necessary for each.
>
> "It is foolish to consider replanting millions of acres to forests unless the owners of millions of acres already under forest are convinced of the necessity and economy of caring for them in such a manner that they will be perpetuated and improved".

There are a number of reasons for the widespread practice of allowing woodland grazing. The woodlot has always been considered a pasture field even though the value of woodland pasture is low compared to cleared land. The reason for its low carrying capacity is partly because grass grown in the shade is not nearly as high in food value as that grown in full sunlight. The following statement in respect to woodland pasture has been made by leaders in agriculture: "On the whole, the opinion of the Agronomists is that, on the average, woodland pasture will produce about

one-sixth the quantity of pasturage, and the quality will be about one-half as good as that of the improved pasture". Weeds are usually prolific in wooded pastures, often smothering most of the grass.

If shade is required for stock, it may be desirable to leave a portion of the woodlot in the pasture when fencing the woodlot. Another solution is to establish small groves of fast-growing hardwoods which can be fenced temporarily until the trees are sufficiently tall that browsing will not damage crown growth. Where springs or streams that supply water for the stock are situated in the woodlot access may be made to a trough near the spring and the area should be fenced to prevent trampling.

A fully timbered maple stand, 60 years old, may yield about 4,000 board feet of saw timber per acre. Such a woodlot is virtually ruined by 20 years of heavy grazing, whereas 20 years of protection and no logging may increase the net volume to approximately 8,500 board feet per acre. The gain of 4,500 board feet is equivalent to an annual increase of 225 board feet per acre. At $28 per thousand on the stump this amounts to a mean annual gross income of $6.30 per acre over the period, utilizing only the increase in volume.

Livestock admitted to woodland browse on the leaves and shoots of small trees and ride them down, and by scuffing the surface roots of larger trees injure them and permit entry of fungus diseases.

Field observations indicate that cattle have preference habits in grazing woodlands. Unfortunately this preference is for the more economically desirable species such as maple, basswood, elm and beech, whereas undesirable species such as hornbeam, blue beech, dogwood and hawthorn are grazed only when cattle are seriously underfed. This combination of factors, under continued grazing, changes not only the quantity but the quality of the reproduction and so

the succeeding stand. The poorer hardwood species, and conifers where these occur, are favoured. The invasion of pastures by cedar and hawthorn is an illustration of this grazing preference.

Livestock grazing affects more than the growth of trees on the owner's land. Soil erosion in the woodland increases as the absorptive capacity and mechanical protection afforded the soil by the litter is reduced. The open canopy exposes the soil to the erosive force of rain impact and a compacted soil forces overland movement of water. Livestock tend to follow trails in the woodland and these often become centres of serious erosion. Thus continued grazing increases surface run-off and soil erosion.

Obviously continued woodland grazing is more than the private affair of the property owner. Anything which contributes to soil loss and to increased surface run-off lowers the yield capacity of the land on the one hand and adds to the flood hazard on the other. The lessened value of wood products reaching the market and the increased cost per cow on poor pasture are economic losses to the community as well as to the individual. The Authority is therefore justified, not only in carrying out a vigorous campaign of education in woodland improvement, but also in offering direct assistance to woodlot owners. The County of Halton has already adopted a program of assistance for fencing of woodlots, although to date this program has not had a very marked success. It is recommended that the North Grey Region Conservation Authority, through discussions with woodlot owners, should formulate some modification of this program which will stimulate action toward the elimination of woodland grazing.

3. Forest Fire Protection

Although much publicity has been given to the damage caused by fire, the average person does not realize how serious this damage is. He may know that young growth

and small trees are burned by surface fires but he does not realize the extent of the less obvious damage such as the destruction of humus which itself preserves the condition and water-retaining capacity of the soil. When the humus and ground cover are destroyed, the sun and dry winds remove the moisture required for tree growth and plant nutrients are destroyed. The heat of the fire also injures the growing tissue inside the bark of older trees which are not actually burned, exposing the wood to attack by insects and fungi. Even though through time the wounds may be completely healed, the damage shows up as defects when the tree is cut for lumber.

The first step in fire control is fire prevention, and the best assurance of prevention is an enlightened public opinion which will make every member of the rural community conscious of the seriousness of the fire damage and of his duty as a citizen to do all he can to prevent it. The farmer can prevent most fires in farm woodlots if he exercises the same care that he does around his home and buildings. It is particularly necessary to exercise such care in areas which have been cut recently, since the accumulation of slash creates a serious fire hazard. Close utilization of tops and the scattering of slash so that it lies close to the moist ground and rots faster will help to reduce this danger.

From the evidence collected in the northern states of the United States, where conditions most nearly approximate those of rural Southern Ontario, it is apparent that the most effective fire protective systems are those set up under the following conditions:

(a) Where the system is organized under the direction and control of the state forester and the wardens in each township are appointed by him on the recommendation of the local council.

(b) Where wardens paid an annual retainer are actual residents in the locality. Usually they are farmers who have had practical instructions in fighting fire. They have the power to call out other local residents to help in fire-fighting and maintain a store of fire-fighting tools on their premises.

(c) Where the warden is assisted in his work by all members of the community. That is, his address and telephone number are known to everyone and fires are reported to him immediately.

(d) Where designated members of the community know that they are likely to be called on to fight fire and are paid so much per hour for the time they are so employed.

(e) Where every resident is thoroughly fire-conscious and realizes that loss of timber by fire is a loss to the whole community, and considers it his duty to prevent, report and fight fire.

It is therefore recommended that the Authority set up a committee to determine the best method of providing fire protection for public and private lands, through the co-operation of the Department of Lands and Forests, for the protection of woodlands in the North Grey Region.

4. <u>Protection from Insects and Diseases</u>

In projects such as the public and private reforestation recommended for the North Grey Region, careful consideration should be given to the prevention of outbreaks of insects or tree diseases and adequate arrangements made for the immediate application of control measures when these become necessary. While it is not possible to predict accurately the course insects or disease may take under the ever-changing conditions of a newly forested area, there are a number of fundamental principles which, if applied, will greatly lessen their destructiveness.

Large areas of one kind of tree present ideal conditions for an outbreak of insects or fungus disease. Mixing species in the plantation or separating the species in small blocks tends to slow the spread of outbreaks until natural agencies bring them under control or direct control measures can be applied.

It is important to plant only the species of trees suitable to the site and existing growing conditions. Healthy, vigorous trees are certainly more resistant to attack than weak, struggling ones.

Over-mature and dead trees should be removed from the existing stands as these harbour bark-beetles and wood-boring insects which may become excessively abundant and attack healthy, adjacent trees. Fungus infections may likewise spread from such sources.

Care should be exercised to prevent ground fires. Even light ground fires are frequently followed by severe outbreaks of bark-beetles and wood-boring insects and fungus infection at the base of the trees.

It is essential that an inspection be made each year so that any abnormal increase in insects or disease may be noted and control measures initiated before the outbreak becomes serious. Prompt action may reduce control measures to a comparatively easy task and confine damage to a small area.

(a) <u>Some Important Insect Pests</u>

The White Pine Weevil has caused serious damage to plantations by attacking the leading shoots of young white pine. As this insect prefers to work in full sunshine, white pine should be grown in mixture with some other species which will shade the pine in its early years.

In recent years the European Pine Shoot Moth has increased to epidemic proportions in red and Scotch pines. Investigations are under way but no simple and effective control measures have yet been discovered. Another enemy

of these species, the Root-collar Weevil, has recently been reported near Angus in Simcoe County. This insect kills young trees by girdling them below the ground. In the U.S.A., where this insect is better known, certain emulsions applied around the base of infested trees are said to give good control.

Leaf-feeding insects may kill conifers by one complete defoliation and hardwoods by defoliation for three years in succession. However, even partial defoliation may so weaken trees that they will be attacked by other enemies. Protection from leaf-feeding insects is therefore desirable. This is the kind of attack against which spraying is most successful.

Since investigations of forest insects are constantly under way, the owner considering insect control should always check with the Zone Forester to find the most effective methods now in use.

(b) Tree Diseases

The chief diseases of the hardwoods are the various trunk, butt and root rots, and chronic stem cankers, which are all endemic and may cause serious damage under aggravating conditions. Woodlots in the North Grey Region present very diverse conditions with respect to the incidence of these diseases, a circumstance which is usually related to their past history. Thus many containing old timber are in need of heavy preliminary salvage and sanitation cuttings as a result of mismanagement or neglect. Such cuttings should precede or be combined with cleanings and improvement cuttings, designed to improve the composition and structure of the stands. Having established a sanitary condition, normal care should maintain it and obviate loss on account of decay.

The wood rots are commonly thought of as diseases of mature and over-mature timber, but experience has shown that infection may occur at a very early age. In

hardwood sprouts the stem may be infected from the parent stump. In older trees infection is chiefly through wounds, either of the root or trunk, which may be caused by fire, trampling by animals, insects, meteorological agencies, or by carelessness or accident in felling and other woods operations.

For many reasons "cleanings" in the reproduction are desirable, especially where the woods have been heavily cut. Besides favouring the valuable species, those stems which are of seedling origin should be favoured over stump sprouts which are more liable to decay.

In harvest cuttings, which should recur at frequent intervals, the permissible volume allotted should include trees in which incipient decay is discovered and so far as possible those which have become a poor risk through injury or other circumstances.

The white pine blister rust is a serious enemy of that important species. It can be controlled by elimination of the currant and gooseberry bushes which spread the disease. This is economically feasible where white pine is growing on good sites, and where a considerable concentration of white pine on a small area reduces the labour involved.

The Dutch elm disease, which causes rapid wilting and death to all native elm trees and most introduced species, has caused great concern ever since its first discovery in Canada in 1944. It has spread rapidly across Southern Ontario and, although no positive identification of the disease has been made as yet in Grey County, it is quite likely to be there either now or in the near future. Control is achieved by elimination of diseased trees and by spraying healthy trees to prevent attack by the elm bark beetles which carry the disease. For valuable trees in parks, along streets or around houses, the cost of control is well within reason. The Authority should alert its member municipalities

to the danger and co-operate with them in making plans to control this disease.

5. Windbreaks and Shelterbelts

In the process of clearing land for agriculture, woodlots and belts of trees along fence lines have been removed which had served as natural shelterbelts. The restoration of these in the form of windbreaks is essential to a complete conservation program in many parts of Southern Ontario.

When proper species are used and windbreaks are correctly placed the effects are almost entirely beneficial. The effects may be direct or indirect, but in either case are the result of reduction in wind velocity. The effects of windbreaks on crops and cultivated fields may be listed as follows:

(a) Direct Effects

(1) Wind damage and lodging in small grains and corn is reduced or eliminated.

(2) Snow and the resultant moisture are more evenly distributed over fields, particularly on the higher spots where they are required most.

(3) Wind erosion of the soil is minimized.

(b) Indirect Effects

(1) Moisture loss by evaporation is reduced.

(2) Temperatures in the fields are raised, which may prevent frost damage, accelerate growth and even lengthen the growing season slightly.

(3) Erosion of the soil by water may be reduced by its more even distribution when released from snow.

The benefits of windbreaks to buildings in reducing heat loss in winter have been shown to be considerable. Experiments conducted in the United States proved that more than twice as much heat is lost from a house, per day or per hour, with a wind of 20 m.p.h. as with one of 5 m.p.h., and a windbreak can easily reduce wind velocities in this proportio Used in this way they can often be made to form an effective background for the house and a protection for farm buildings.

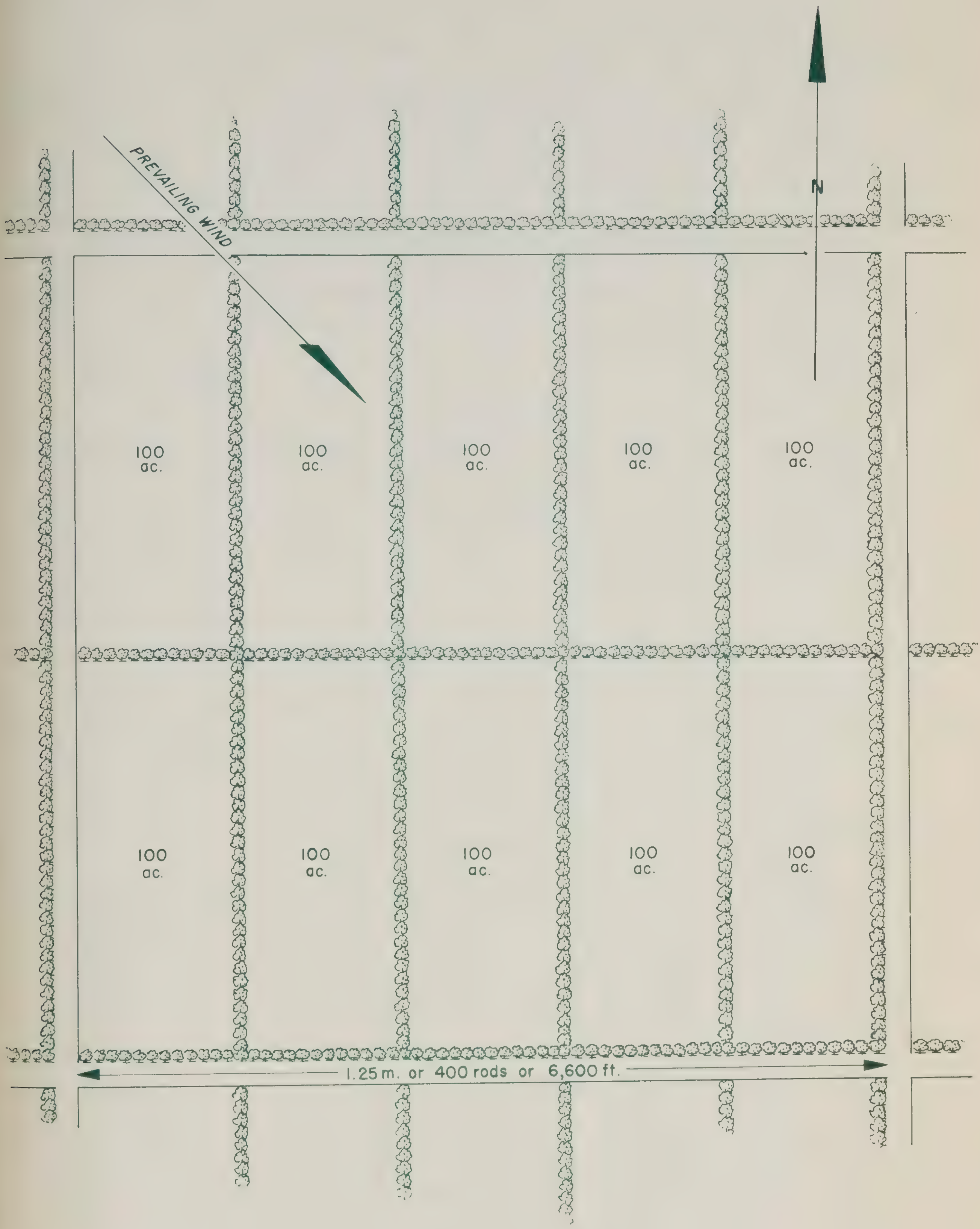
Another advantage of windbreaks is that they provide shelter and runways for insectivorous birds and small animals.

Belts of trees comprising one or two rows are usually called windbreaks, and with more than two rows, shelterbelts. In Southern Ontario windbreaks as a rule give sufficient protection except where wind erosion of soil on rolling land is severe, when shelterbelts may be required. On level land windbreaks may nearly always be established along existing fence lines, but on rolling land consideration should be given to the contour of the land. The prevailing winds in Southern Ontario are generally from the west, so that the greatest protection will be derived from windbreaks on the west side, but the placement of windbreaks on the other three sides as well should be considered.

Both the height of the trees and the wind velocity influence the effective range of a windbreak. An average windbreak will reduce the ground velocity of a 20-mile wind 10 per cent or more for a distance of about 30 times the height of the trees. About one-fourth of this effect will be felt on the windward side of the windbreak and three-fourths on the leeward side. For example, if the trees are 40 feet high the total effective range with a 20-mile wind will be 30 x 40 or 1,200 feet, 300 feet of which will be on the windward side and 900 feet on the leeward side. Generally speaking, the reduction in velocity is greatest close to the windbreak and tapers out to zero farther away. With higher wind velocities and/or higher trees the proportionate reduction and the effective range will be greater.

One consideration that should be kept in mind is that under certain circumstances windbreaks may cause air stagnation, which may increase temperature and moisture conditions to a dangerous degree in summer or increase frost damage in spring and fall on small areas, particularly in hollows. Where this is likely to occur, windbreaks should be planted so as to guide the flow of air past such spots.

WINDBREAK PLAN
for
1,000 ACRE BLOCK



This plan shows the minimum windbreak requirements for a 1,000 acre block on level land. Woodlots and plantations will replace some of this and placement will have to be adjusted according to topography and soil on rolling land.

Where these conditions develop after the windbreaks are established they may be relieved by judicious opening up of the windbreaks.

Experience has shown that windbreaks are an asset to any farm, that their adverse effects, if any, are local and easily remedied, and that in many areas they are essential to the control of soil erosion by wind. It is therefore recommended that the Authority encourage the establishment of windbreaks by private owners in every way.

6. Snow Fences

In the climate of Southern Ontario snow drifting may cause much inconvenience and sometimes hardship. Control can be readily effected by means of windbreaks and is dependent on proper placing with reference to lanes of travel and topographic features.

Where space is limited or land valuable lath or board fences are frequently used, but the cost of erection, removal or maintenance of these can be materially reduced by using trees as permanent windbreaks or shelterbelts.

The object of a snow fence is to mechanically reduce wind velocity near the ground in such a manner as to cause a drift to form where it will be least harmful. The reduction in velocity creates two pools of relatively calm air, a small one on the windward side and a much larger one on the leeward side, and it is here that drifts form, leaving the area farther to the leeward free of drifts and comparatively free of snow. As winds become stronger the wind reduction and the width of the calm pool on the leeward side will increase and the centre will tend to move farther away from the windbreak.

A wide belt of trees which will accumulate a large drift of snow on its windward side may be planted right to the edge of the road, the windward edge extending back a distance equal to three or four times the height of the trees and generally at least 100 feet.

In some places the snow trap type of windbreak is effectively used. It is composed of one or more rows of trees close to the road with a wide opening to windward and then a single row of trees. The single row arrests the first force of the wind and the snow is deposited in the opening. This has the advantage of requiring fewer trees than the shelterbelt and leaving the ground between open for cultivation in the summer.

Poor placement of windbreaks may accentuate drifting conditions. A single row of trees, unless it is a dense coniferous type, is seldom dense enough to completely stop winter wind, and may likewise create drifts.

Any prejudice which may exist against windbreaks for protection against drifting snow on roads arises from such poor or poorly placed windbreaks. If a windbreak has openings in it or if it ends abruptly streamer drifts will form. Windbreaks should be kept dense and tapered down at the ends by using progressively smaller species of trees and shrubs to prevent the formation of streamer drifts.

Trees are being used successfully as snow fences in Ontario by the Department of Highways, by railways and by a number of counties. Good examples are to be found along Highway No. 10 south of Flesherton. Every encouragement should be given to the establishment of such snow fences in place of the removable type of lath fence now in use.

The woodlot can be improved by using the poorer trees for fuel.

In the Robertson Plot, the Township of St. Vincent shows how a rough hillside can be made beautiful and productive.

A well-placed snow fence piles the snow where it will do no harm and leaves the road surface clear.

CHAPTER 6

MARKETS AND MARKETING

Although no detailed survey was made of the wood-using industry in the North Grey Region, it is obvious that many of the towns in and around the area are dependent on the wood supply for their main industries, particularly furniture making. High quality maple is shipped as dimension stock to other parts of Canada and the U.S.A. For many rural residents woodland revenue is either a major part of their income or an important supplement to it. Therefore, the orderly flow of woodland products to market is of importance to all sections of the community.

The breadth of the market varies greatly with quality. For high-grade products, such as veneer logs, buyers will come one hundred miles or more. For low-grade logs, 20 miles may be the limit, and often it is difficult to find a buyer at all.

This difficulty applies to all low-grade or small material which the owner should remove to improve the growth of quality material in the woodlot. The market for fuelwood has declined sharply in the face of competition from other fuels, but this use still remains of some importance. A pulpwood market for thinnings, particularly hardwood thinnings, could be of great value. Recent advances in the pulp and paper industry have already established such a market in some parts of Southern Ontario and it is reasonable to expect some such development for the North Grey Region within the next few years. This type of market does not promise large returns to woodlot owners, but it does promise to defray the cost of woodlot improvements which will allow the progressive owner to produce the quality products from which his real profits are derived.

The importance of quality products is well illustrated by the comparisons made in a Department of Lands

and Forests news release which is quoted in part below:

> "There is no commodity produced on a farm which will vary as much as wood ... Our woodlots and pine plantations in Southern Ontario yield a variety of products. In order to compare their relative values, it is necessary to arrive at a price per cubic foot of wood for each product. The following prices should not be taken as exact, as they will vary with quality, quantity, ease of logging and the bargaining power of the landowner. However, these prices will serve to show a comparison of net values from various products. Fuelwood, at $1.00 per short cord is worth about 4 cents per cubic foot. Pulpwood from pine thinnings at $2.00 per full cord is worth about 2½¢ per cubic foot. Small pine logs from 6 - 8" in diameter at 3¢ per running foot are worth about 9¢ per cubic foot. Cedar posts 8' long, having a 5" top at 20¢ each are worth about 10¢ per cubic foot. Small sawlogs 10 - 15" in diameter, of valuable species, such as hard maple, oak, ash, etc., at $40.00 per thousand board feet, Doyle Rule, are worth about 16¢ per cubic foot.
>
> "Large sawlogs of less valuable species, such as elm, beech, soft maple, averaging 20" in diameter, and valued at $25,00 per thousand, Doyle Rule, are worth about 17¢ per cubic foot.
>
> "Good quality sawlogs of hard maple, pine, oak, etc., averaging 20" in diameter at $60.00 per thousand board feet, Doyle Rule, are worth about 40¢ per cubic foot.
>
> "Veneer quality logs of maple, oak, cherry, etc., averaging 22" in diameter at $90.00 per thousand board feet, Doyle Rule, are worth 65¢ per cubic foot."

Besides giving attention to the growing of more and better woodland products, any woodlot owner should know enough about harvesting and marketing to get the most out of his present and future production.

1. <u>The Timber Harvest</u>

Harvesting of timber involves four operations: estimation of volume, cutting, skidding and hauling. The owner may perform all operations, selling his logs at the mill; he may cut and skid the logs, selling them at the roadside; or he may sell his timber on the stump.

(a) <u>Estimating</u>

Estimation of timber may be done either in the tree (cruising) or in the log after cutting (scaling).

Some operators cruise timber by rough ocular estimate; that is, by walking through the bush and estimating, on the basis of past experience, the number of board feet in

the stand. The most accurate method would be to measure each tree, consider taper and defect, estimate and tally its volume. In large wooded tracts only a representative sample, say 10 per cent or 20 per cent, may be measured and the total estimated from this sample.

One example may illustrate the value of a tallied cruise. Some years ago, in competitive bidding for 87 acres of woodland, one operator estimated a stand, by tallying every merchantable tree, to be 700,000 board feet; the chief log buyer for a large furniture manufacturer estimated 350,000 board feet; another operator estimated 100,000 board feet. The actual cut from the stand was 746,000 board feet. Obviously such discrepancies are of concern to the seller as well as to tbe bidder who tries to maintain his place in competitive buying. Before selling standing timber, it would pay the owner to make a tallied cruise or, if necessary, to hire professional assistance for this purpose.

Similarly, when selling logs, the owner or his agent should assist in their measurement, try to understand the allowance which must be made for defects and assure himself that he is being fairly treated.

(b) Cutting and Skidding

In a typical hardwood operation, the value of logs at the roadside may be half as much again as that of logs in the standing tree. The difference is mainly labour cost.

By performing the operations of cutting and skidding, the farmer increases his return by selling his labour and use of his equipment instead of just his stumpage. The flexibility of woods work in fitting into otherwise slack seasons on the farm should make this increased return particularly attractive. In addition, the farmer doing his own cutting is best able to determine that the right trees are removed and damage to the remaining stand kept as low as possible.

(c) Hauling

Truck-hauling has increased the distance from which mills can secure their logs. Cost per thousand board feet hauled depends largely on distance. Thus, while grade 1 logs might be hauled up to 50 miles, the lower value of other logs might limit practical hauling distance to 15 or 20 miles.

While actual figures will vary greatly, the example below will suggest the change in log value at various stages.

Value of logs in the tree (stumpage)	$28 per M board feet
Making logs from tree	8 " " " "
Skidding logs to road	6 " " " "
Hauling logs to mill	8 " " " "
Value of logs in mill yard	$50 per M. board feet

2. Timber Sales

(a) Outright Sale of Woodlot

Frequently a sawmiller finds the simplest procedure is to buy the woodlot or farm outright. In this case, the former owner has no further interest in the land. The practice of slashing such woodlots and leaving them to become tax-delinquent was legitimate cause for community concern. Where tree cutting by-laws are rigidly enforced, this abuse should be kept under control.

(b) Sale of Cutting Rights

Under this method the owner sells the right to cut all timber of certain species down to a certain diameter; or the trees to be cut may be marked in advance and the sale made on this basis. Often only a very vague word-of-mouth agreement is made and misunderstandings are common. A simple written agreement such as that suggested later in this chapter would avoid this confusion.

A lump-sum method of payment is often used on such sales, based upon a volume estimate by the buyer. As mentioned in the section on cruising, the volume estimates of different bidders may vary considerably. The seller is

therefore advised to consult the list of buyers of woodland products in the hands of the Zone Foresters and to obtain competitive bids from as many buyers as possible. On lump-sum purchases the buyer takes all the risk as to accuracy of estimate and quality of timber.

Selling the standing timber at a rate per thousand feet removes the uncertainty of volume estimates and requires measurement of the logs after cutting. Two uncertainties remain - the log rule to be used in measurement and the assignment of logs to different grades which differ in prices per thousand board feet. For Provincial Government transactions the new Ontario Log Rule is now required, but for private sales there is no set standard, the Doyle Rule being most commonly used. The woodlot owner seldom knows the problems of processing logs into lumber sufficiently well to understand fully why the buyer assigns some logs to lower grades. Publication of price lists and grade specifications by log buyers would promote better relations with woodlot owners. Possible arguments and ill-feeling over these matters are factors in making some buyers prefer lump-sum purchase. The woodlot owner must decide whether to accept volume and grade risks in the hope of getting a better price by selling on a log measurement basis.

In the event that he chooses to be paid on a volume-removed basis, just what the buyer intends to cut and pay for should be absolutely clear. Only the best trees might be removed, and it is possible that only the best logs from these trees might be taken. This leaves the owner with many poor-quality logs which he cannot readily sell and with some poor trees standing which he wanted cut. The volume actually paid for might be small, and the woodlot owner's total realization on the transaction might be less than he would have received had he accepted payment in a lump sum.

No matter which of these two methods is chosen, a written Timber Sale Contract should cover the transaction.

It should set forth all the details necessary as to prices, species, sizes, rights granted to the buyers, limiting dates, times of payment and so on.

(c) Owner-Made Logs

The woodlot owner who has decided to realize not only the value of his woodland product but also the additional labour income derived from its harvest prefers to take payment at a price per thousand board feet for logs placed on skids at the roadway or logs delivered to the mill. Here again the securing of competitive bids and a clear understanding with the buyer regarding log grade will avoid any feeling of unfairness in the deal. An owner who simply arrives at the mill with a load of logs may feel that he has to accept the offered price even though he is dissatisfied.

3. Timber Sale Contracts

As an aid to people who are unfamiliar with timber sale agreements, a sample contract is given here. It shows the more important provisions that should be included in a contract for the sale of marked trees to be scaled in the log. Substitute clauses are given for use in other kinds of sales. No single form of contract will suit all classes of sales, but owners of woodland timber should have no difficulty in adapting this contract to their use.

SAMPLE TIMBER SALE CONTRACT

Agreement entered into on this .... day of........ between ....of .... hereinafter called the seller, and ....of ....hereinafter called the purchaser. Witnesseth:

ARTICLE I. The seller agrees to sell the purchaser, upon the terms and conditions hereinafter stated, all the living timber marked or designated by the seller and all the merchantable dead timber, standing or down, estimated to be .... board feet, more or less, on Lot ..... Con......

in the Township of ....County of ....
and located on a farm owned by the seller and about ....
miles from ....

ARTICLE II. The purchaser agrees to pay the seller the sum of .... more or less, as may be determined by the actual scale, at the rate of ....per thousand feet ....
....
....
payable prior to the date of removal of material, in instalments of .... each.

ARTICLE III. The purchaser further agrees to cut and remove said timber in strict accordance with the following conditions:

1. Unless an extension of time is granted all timber shall be cut, paid for, and removed on or before ....
....

2. Saw timber shall be scaled by the .... log rule, and measured at the ....
....

3. The maximum scaling lengths of logs shall be 16 feet; greater lengths shall be scaled as two or more logs. Upon all logs an additional length of 4 inches shall be allowed for trimming. Logs over-running this allowance shall be scaled not to exceed the next foot in length.

4. No unmarked timber of any kind shall be cut, except
....

5. Stumps shall be cut so as to cause the least possible waste - stumps of trees up to 16 inches in diameter, not higher than 12 inches above the ground, and those of trees above this size at a distance above the ground not greater than three-fourths of their diameter.

6. All trees shall be utilized in their tops to the lowest possible diameter, for commercially saleable material.

7. Young trees shall be protected against unnecessary injury; only dead trees and less valuable kinds may be used for construction purposes in connection with lumbering operations.

8. Care shall be exercised at all times by the purchaser and his employees against starting and spreading of fire.

ARTICLE IV. It is mutually understood and agreed by and between the parties heretofore mentioned as follows:

1. All timber included in this agreement shall remain the property of the seller until paid for in full.

2. In case of dispute over the terms of this contract, final decision shall rest with a reputable person to be mutually agreed upon by parties to this contract, and in case of further disagreement, with an arbitration board of three persons, one to be selected by each party to this contract, and a third to be the Zone Forester or his chosen representative.

In witness whereof the parties hereto have hereunto set their hands and seal this .... day of ....
19........

Witnesses:

....

....

The following are sample clauses that should be substituted in the contract when other methods of sale are used. In lump-sum sales substitute in Article I a descriptive clause modelled on this one:

All merchantable living trees, except ....
....which measure 12 inches or less in diameter at breast height (a height of $4\frac{1}{2}$ feet above the ground).

Such provision will reserve the basis of a second crop consisting of the more valuable and rapid-growing kinds of trees and remove all the inferior and slower-growing trees.

The payment clause in lump sum sales should be varied to read somewhat like this:

The sum of ....dollars for said timber, payable prior to the cutting of the material, in instalments of .... dollars each, payable on or before ....respectively.

4. Attempts at a Solution of the Marketing Problem

Orderly marketing of woodland products is to the advantage of the woodlot owner, the sawmill operator, and the ultimate industrial consumer who requires definite quantities of certain species in certain grades to carry on his manufacturing business. It has already been remarked that the farmer feels at a disadvantage in marketing logs, and his real or imagined grievances are a detriment to good relations between the buyer and seller of logs and a steady flow of logs to the market. The following attempts at improved marketing may suggest methods which could be applied in the North Grey Region.

(a) A Marketing Experiment near Doon

During the winter season of 1948 and 1949 the Department of Lands and Forests in the Galt Zone carried out an experiment in the marking and marketing of timber in an 18-acre woodlot near Doon. The project was initiated by Mr. I. C. Marritt, the District Forester, and the field work was done by Mr. L. S. Hamilton, Zone Forester. The scheme is patterned after a marketing assistance method meeting good success in the State of New Jersey.

The mixed uneven-aged woodlot contained considerable large white pine and red oak. Initial investigations by the Department showed growth stagnation due to over-stocking and recommended the removal of certain trees representing the accumulation of growth over a number of years. Under this condition, removal of selected trees

reduces the growth stagnation factor, and the remaining trees grow at an increased rate. As growth again slows down, another cropping should take place. This is the simple principle of selective logging - the removal of accumulated growth periodically to keep the stand at a healthy, productive growth rate.

Upon explanation of the proposed marketing assistance, the woodlot owner entered into a signed agreement with the Department as a co-operator, agreeing not to sell or allow to be cut any trees except those marked, upon penalty of a nominal fine per thousand for the estimating and marking service of the Department.

The trees were marked with a view to a second marking which would be necessary afterwards to remove weed trees and trees of low value in order to give good growing conditions. Each tree marked for removal was blazed at breast height and below stump height, the stump blaze being branded to detect any unauthorized cutting. The total log scale estimated for the 223 trees marked was 47,600 board feet, Doyle Rule. The trees were listed as to species and diameter on a mimeographed form.

All the estimation data were turned over to a timber agent chosen by the Department. The timber agent entered into written agreement with the owner to -

(1) solicit tenders from buyers;

(2) draw up a timber sale contract protecting the owner;

(3) check on cutting operations; and

(4) measure and collect payment for all wood cut before its removal from the property.

The agent was to receive a percentage commission of the gross sale value.

The timber agent mailed the volume estimate sheets to all local log buyers, giving location of the woodlot and inviting inspection of the bush.

The timber sale contract set forth the prices agreed upon for the different species, required that tops be worked into 4-foot wood to be paid for at an agreed price per standard cord, provided penalties for the cutting of unmarked trees and required that the woods operation be conducted with a minimum of damage to the woodlot.

Prices realized by the owner were much better than the average paid in the area. Prices per thousand board feet, Doyle Rule, for the standing timber were:

White and red oak	$62
White ash, soft maple, hard maple, basswood and cherry	$60
White pine	$55
Hemlock	$45
Beech	$30
Fuelwood	$4 per standard cord.

The experiment was considered very successful by all the parties concerned, yielding about 2,000 board feet more than estimated, and the woodlot has been left in fine growing condition with an expected second cut in 15 or 20 years of 25,000 board feet.

(b) The Lanark County Co-operative

This co-operative was set up by a group of woodland owners in the County of Lanark in March, 1950. Its objectives are the better management of privately-owned woodland to ensure a continuous yield of the best material possible from the forested land of the members through profitable marketing of all the woodland products.

To put the woodland enterprise on a paying basis to the individual, it is necessary to market not only the material suitable for lumber manufacture and special products such as veneer but also the inferior products such as the poorer hardwood species, low-grade hardwood logs of the better species, small softwood products such as cedar posts and poles and that material removed in improving a

woodlot during what may be called sanitation cutting. It was felt that the advantages of co-operative action by woodland owners in the field of marketing would best solve the problems of the individual, particularly in respect to inferior or small products. Acting as a group rather than individually and through a member active in contacting prospective buyers, they can hope for recognition by the buyers in the area as a stable source of the various woodland products.

The establishment of the co-operative followed an extensive educational campaign carried on by fieldmen of the Federation of Agriculture, the Department of Lands and Forests and the local Farm Forum leader. Interest was aroused through moving pictures, talks at schools, local evening meetings, press releases, radio programs and public speaking competitions on woodlot management. Meetings held at Lanark were attended by officers of the Department of Lands and Forests; representatives of pulp and paper companies, sawmills and other wood-using industries; and members of agricultural organizations. Gradually a workable plan was evolved, and the Lanark Forest Co-operative was set up under a number of directors, with Mr. Herb Paul as manager.

Mr. Paul, of Lavant, the main force behind the formation of the co-operative, is an energetic leader of the local Farm Forum, caretaker of the Lanark County Forest, a farmer, and owner of several hundred acres of woodland in Lavant Township. As manager of the co-operative his duties entail the location of markets for the woodland products of the members, arriving at satisfactory price schedules, collection of payment for products, ensuring that products are ready or delivered at the time promised and advising members on cutting their woodland according to best forestry practices.

In the fall of 1950 membership in the co-operative was approximately 60, with an increasing interest in its operations prevalent. By September, 1955, it had grown to 150 members, with total holdings of 35,000 acres in

Lanark and Frontenac Counties. The membership fee is $5, and in addition the co-operative takes 5 per cent of the sale proceeds of products handled. The member pledges himself to supply the quantity of material at the time and place agreed and is urged to practise woodlot management according to conservation principles.

At present the co-operative has no intention of undertaking a manufacturing endeavour such as a sawmill for lumber or railway ties. Logs are not accumulated at a central point and sorted as to species and a grading standard, but are handled direct from woodland to buyer. The purchaser's measure of the volume, by grade where it might apply, is accepted as the basis for payment on transactions.

An objective of the co-operative, stated as the better management of privately-owned woodland to ensure a continuous yield of the best material possible, is a highly commendable aim. However, the statement entails a tremendous amount of field work on the part of those capable of advising on the subject of woodlot management. This is a job requiring experienced field personnel. At present, although the Department of Lands and Forests is following this development in marketing with interest and co-operation, it has not the staff of extension foresters to provide the many owners of farm woodland with the guidance that is necessary. If the farm woodlot is to assume its place in the economics of the farming enterprise, it must be shown that it pays in dollars and cents to the owner. The average woodlot owner cannot afford to carry on practices at a financial loss in the interest of the region or posterity. If, in its infancy, the co-operative manages to make money for its members by the sale of those products generally difficult to market as well as those relatively easy to market and does the best it can toward field guidance on woodlot management for perpetual yield, then it will have done a lot toward good forestry in its area.

NORTH GREY REGION CONSERVATION REPORT

WATER

ONTARIO DEPARTMENT OF PLANNING AND DEVELOPMENT

CONSERVATION BRANCH

CHAPTER 1

THE REGION

1. Dimensions, Boundaries and General Description

The North Grey Region Conservation Authority covers a kidney-shaped area of 654.5 square miles measuring about 26 miles across the lobes, 11 miles across its centre and 43 miles across its south-easterly length. It fronts on Georgian Bay and is bounded by the watersheds of Silver Creek, Pretty River and the Nottawasaga River on the east, by the Saugeen watershed on the south and the Sauble watershed on the west.

Four main watercourses, with many tributaries, and many smaller rivers and creeks drain the Region. Their locations are shown in Figure 1 and the drainage areas for each are shown in Table 1.

The terrain is the most rugged in Southern Ontario, with elevations varying from 600 to 1600 feet above sea level. Included in its boundaries are the well-known Blue Mountains which lie to the west of Collingwood, and the Beaver Valley which runs northward from Flesherton to the mouth of the Beaver River at Thornbury. These provide some of the most beautiful scenic views in Southern Ontario and are visited by large numbers of tourists during the summer months and by many ski enthusiasts during the winter.

The Region contains many miles of wooded country roads since almost 25 per cent of the area is covered by forests. These woodlots provide timber for a few remaining sawmills, some of which are still powered by water stored in old millponds.

2. Municipalities

The North Grey Region, located in Grey County, includes two entire townships and parts of ten others; one city, two towns and two incorporated villages. A total of 34,236

TABLE 1 - DRAINAGE AREAS OF THE REGION

Watershed and Fringe Areas	Square Miles	Individual Drainage Areas	Square Miles	Individual Drainage Areas	Square Miles
Pottawatomi River	* 38.3	Sydenham Watershed	79.60	Beaver River Watershed	235.10
Sydenham River	79.6	Main Sydenham River	44.28	Main Beaver River	110.51
Bighead River	132.3	Spey River trib'y	19.70	Most southerly creek above	
Beaver River	235.1	North Spey River trib'y	15.62	Eugenia	14.22
Telfer Creek	25.9	Inglis Falls	70.4	Creek above Feversham	13.83
Keefer Creek	10.7	Sullivan Mills	15.4	Boyne River	27.06
Waterton Creek	22.9	Owen Sound Gauge	70.0	Wodehouse Creek	12.60
Johnson Creek	6.6			Creek through Redwing	47.82
Sucker Creek	13.4	Bighead Watershed	132.27	Grier Creek	9.06
Orchard Creek	5.4	Bighead Main River	53.10		
Meaford Creek	1.9	Minniehill Creek trib'y	10.56	Flesherton	7.95
East Meaford Creek	4.2	Rocklyn " "	15.96	Dam at Eugenia	76.0
Indian Brook	15.5	Walters " "	17.40	Heathcote	213.29
Area **A	4.4	Tributary L	8.46	Clarksburg Gauge	221.0
" B	5.9	" M	4.80		
" C	0.4	" N	5.25		
" D	3.1	" O	8.49		
" E	15.7	" P	8.25		
" F	4.6				
" G	1.6	Oxmead Gauge	115.5		
" H	10.4				
" J	0.8				
" K	15.8				
Total for the Region	654.5				

* Includes 10.5 sq. miles for the Maxwell tributary.

** See Fig. 1. for location of fringe and other areas.

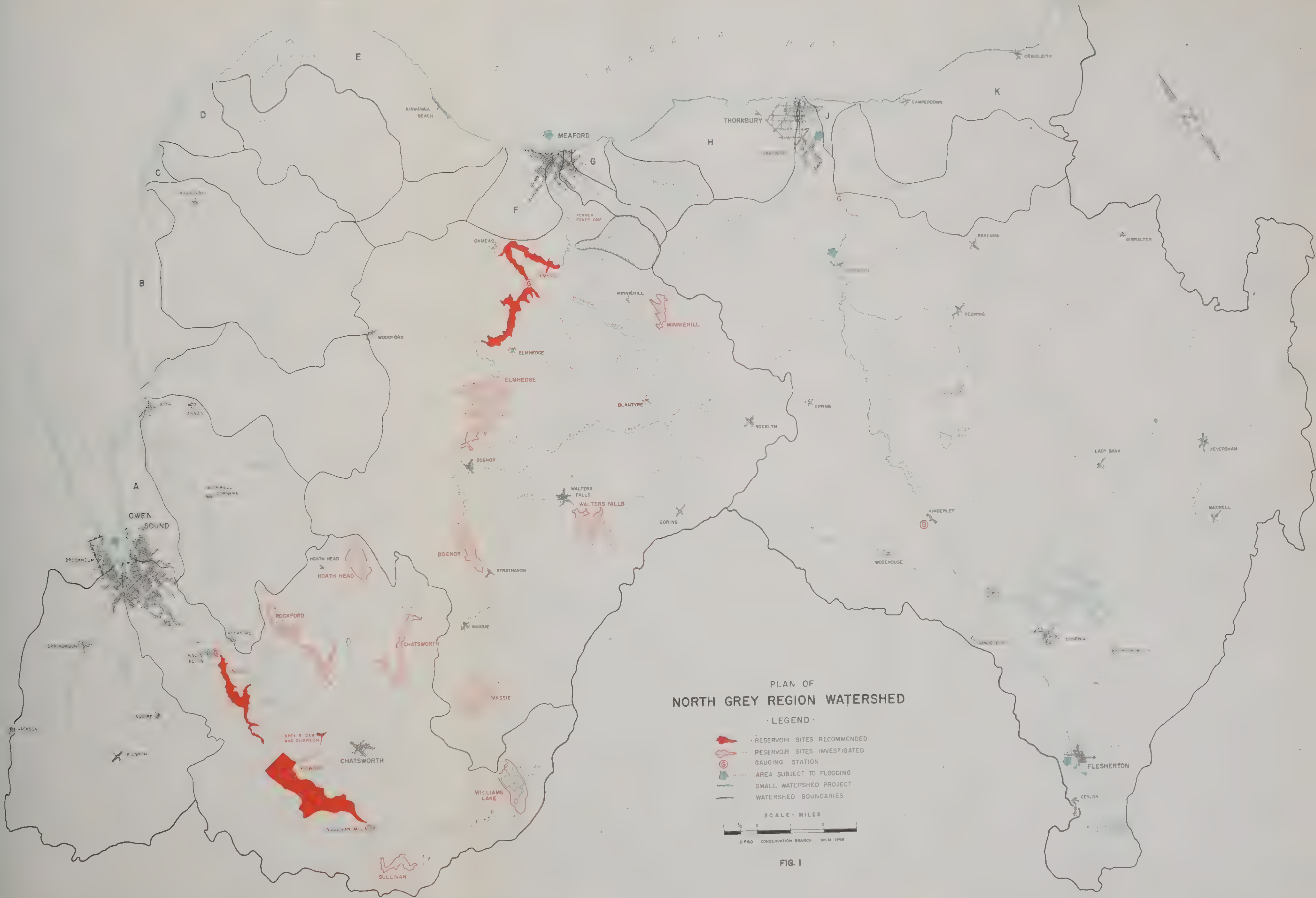

PLAN OF
NORTH GREY REGION WATERSHED
· LEGEND ·
RESERVOIR SITES RECOMMENDED
RESERVOIR SITES INVESTIGATED
GAUGING STATION
AREA SUBJECT TO FLOODING
SMALL WATERSHED PROJECT
WATERSHED BOUNDARIES
SCALE - MILES
CONSERVATION BRANCH
1958
A
B
C
D
E
F
G
H
J
K
KIAWANNA BEACH
MEAFORD
FORMER POWER DAM
THORNBURY
CAMPERDOWN
CRAIGLEITH
RAVENNA
GIBRALTER
OXMEAD
MINNIEHILL
WOODFORD
ELMHEDGE
REDWING
BLANTYRE
EPPING
ROCKLYN
BOGNOR
WALTERS FALLS
GORING
KIMBERLEY
LADY BANK
FEVERSHAM
MAXWELL
OWEN SOUND
HOATH HEAD
STRATHAVON
WODEHOUSE
ROCKFORD
CHATSWORTH
MASSIE
SPRINGMOUNT
SPEY R. DAM AND DIVERSION
WILLIAMS LAKE
SULLIVAN
FLESHERTON
CEYLON

FIG. I

persons live in the Region and their distribution throughout the various municipalities, the areas of the municipalities and their percentages within the Authority are shown in Table 2.

3. Physical Characteristics

(a) Rivers and Creeks

There are four major rivers, namely the Beaver, Bighead, Sydenham and Pottawatomi Rivers, in the Region and these, together with their major tributaries, provide drainage for 74 per cent of the total area.

The smaller drainage systems include Telfer, Keefer, Waterton, Johnson, Sucker, Orchard, Meaford and East Meaford Creeks and Indian Brook. There are also many other smaller, un-named creeks shown on the existing topographical sheets and Figure 1 of this report.

(b) Gradients of Rivers and Creeks and Their Lateral Slopes

It can be seen from the water level profiles and the gradient tables, which appear in Figures 2(a) and 2(b), that the gradients on the main channels of all of these rivers are high. This is quite evident when they are compared with the gradients of the Grand and the Thames Rivers, which vary from 6 to 10 feet per mile. Severe floods, aggravated by the high gradients and lateral slopes, have occurred on at least two of the main rivers in the past.

The overall gradients of the main rivers in the North Grey Region from their headwaters to Georgian Bay are:

River	Gradient feet/mile
Pottawatomi River	19.9
Sydenham River	16.0
Bighead River	19.9
Beaver River	26.9

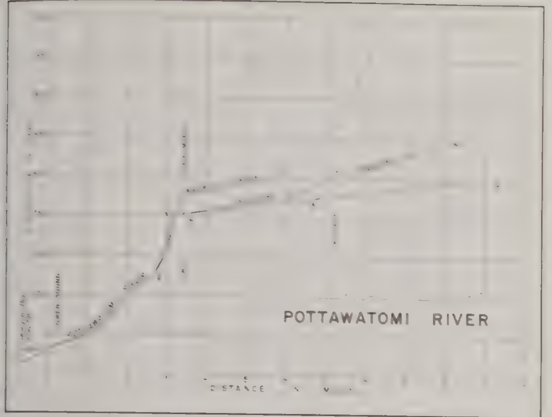
These gradients are the average for the entire length of the watercourses, and particular stretches of the rivers have gradients which vary widely from these averages.

TABLE 2

Municipality	Total Area Sq. Miles	Area within Watershed Sq. Miles	Per Cent within Authority	Total Population (From 1958 Municipal Directory)	Population within Authority
ARTEMESIA Twp.	107.7	51.9	47	1,833	861
COLLINGWOOD Twp.	109.3	91.4	84	2,102	1,766
DERBY Twp.	64.8	45.5	70	1,843	1,290
EUPHRASIA Twp.	117.6	94.3	80	1,879	1,503
HOLLAND Twp.	111.6	51.5	45	1,789	805
KEPPEL Twp. *	144.7	1.9	1	2,013	20
NOTTAWASAGA Twp. *	144.8	1.6	1	3,969	40
OSPREY Twp.	109.6	55.0	50	1,660	830
SARAWAK Twp. *	17.4	1.5	9	1,050	95
SULLIVAN Twp.	118.1	21.2	18	2,102	378
St. VINCENT Twp.	104.3	104.3	100	1,572	1,572
SYDENHAM Twp.	123.8	123.8	100	2,093	2,093
OWEN SOUND CITY	5.3	5.3	100	17,485	17,485
MEAFORD Town	2.5	2.5	100	3,565	3,565
THORNBURY Town	1.1	1.1	100	1,065	1,065
CHATSWORTH Village	0.2	0.2	100	391	391
FLESHERTON Village	1.0	1.0	100	477	477
TOTALS	1,283.8	654.5		46,888	34,236

* Not a member of the Authority

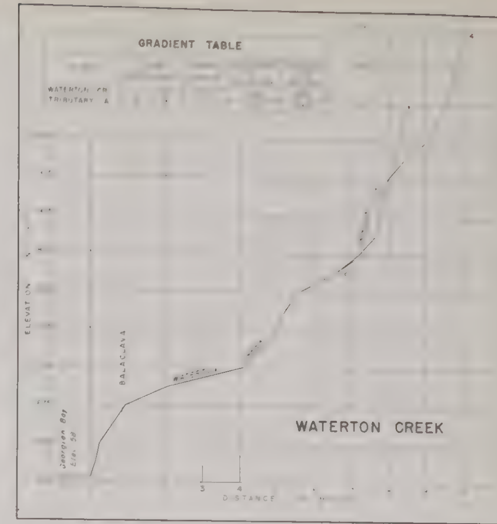
October 1958.



SYDENHAM RIVER

GRADIENT TABLE

RIVER	FROM POINT TO POINT		DISTANCE IN MILES	ELEVATION OF POINTS		DIFFERENCE OF ELEVATION	GRADIENT FEET PER MILE
SYDENHAM RIVER	1	2	2 9	581	625	44	[illegible]
SYDENHAM RIVER	2	3	0 9	625	850	225	[illegible]
SYDENHAM RIVER	3	10	15 8	850	1060	210	[illegible]
SYDENHAM RIVER	10	11	1 8	1060	1138	[illegible]	[illegible]
SYDENHAM RIVER	1	11	21 4	581	1138	[illegible]	[illegible]
SPEY RIVER	4	9	11 9	865	1075	[illegible]	[illegible]
NORTH SPEY R	5	8	9 5	869	1025	[illegible]	[illegible]
TRIBUTARY A	6	7	2 8	927	1025	[illegible]	[illegible]



POTTAWATOMI GRADIENT TABLE

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

INDIAN BROOK GRADIENT TABLE

RIVER	FROM POINT TO POINT		DISTANCE IN MILES	ELEVATION OF POINTS		DIFFERENCE OF ELEVATION	GRADIENT FEET PER MILE
INDIAN BROOK	1	8	9·1	581	1562	981	107 8
TRIBUTARY A	2	4	2 2	825	1150	325	147 7
TRIBUTARY B	3	7	2·5	1040	1575	535	214 0
TRIBUTARY B1	5	6	1 6	1095	1450	355	221 9

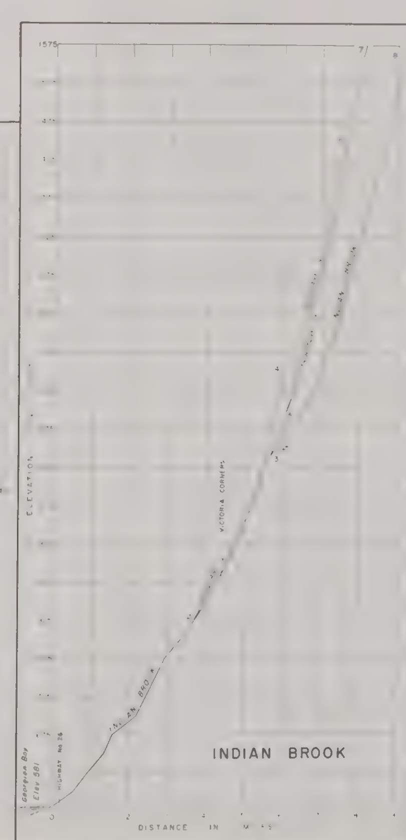
ORCHARD CREEK GRADIENT TABLE

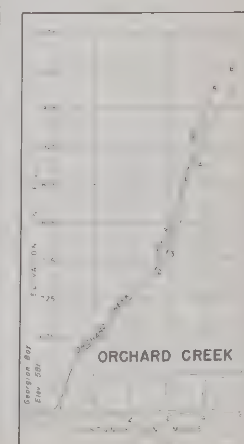
RIVER	FROM POINT TO POINT		DISTANCE IN MILES	ELEVATION OF POINTS		DIFFERENCE OF ELEVATION	GRADIENT FEET PER MILE
ORCHARD CREEK	1	6	4 8	581	1025	444	92 5
TRIBUTARY A	2	4	1 1	762	900	138	125 5
TRIBUTARY B	3	5	1 2	782	1000	218	181 7

BEAVER RIVER

GRADIENT TABLE

RIVER	FROM POINT TO POINT		DISTANCE IN MILES	ELEVATION OF POINTS		DIFFERENCE OF ELEVATION	GRADIENT FEET PER MILE
BEAVER RIVER	1	18	17 6	581	775	194	11 0
BEAVER RIVER	18	23	6 9	775	1422	647	93 8
BEAVER RIVER	23	28	16 1	1422	1675	253	15 7
BEAVER RIVER	1	28	40 6	581	1675	1094	26 9
GRIER CREEK	2	3	4 7	700	1125	425	90 4
TRIBUTARY A	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	36 2
TRIBUTARY B	[illegible]	8	[illegible]	[illegible]	[illegible]	[illegible]	185 2
TRIBUTARY	[illegible]	7	[illegible]	[illegible]	[illegible]	[illegible]	270 6
TRIBUTARY D	10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TRIBUTARY D	16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	39 2
TRIBUTARY D1	13	7	[illegible]	[illegible]	[illegible]	[illegible]	121 6
TRIBUTARY E	11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	47 7
TRIBUTARY F	14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	245 [illegible]
WODEHOUSE CR	19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WODEHOUSE CR	20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WODEHOUSE CR	19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
BOYNE RIVER	21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TRIBUTARY G	22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]





WATER LEVEL PROFILES

SCALES AS SHOWN

DEVELOPED FROM ONE INCH TO ONE MILE TOPOGRAPHIC SHEETS

FIG. 2A

For example, gradients on the Beaver River vary from 11 feet per mile for the 17.6-mile stretch from Kimberly to its mouth, to 281.3 feet per mile for a 1.6-mile stretch on Wodehouse Creek.

Table 3 shows the maximum lateral slopes to the rivers, their tributaries and to the other creeks in the Region. These were determined by measuring the distance on the topographical sheets laterally along a section normal to the river, from the highest contour to the elevation of the river or creek. They are, therefore, maximum slopes and not averages, which would be laborious to determine. It would be safe to say, however, that the average lateral slope would be much greater than the corresponding stream gradient.

(c) Lakes and Ponds

The topographical sheets show some 30 natural or artificial lakes and ponds in the Region. Only 8 of these are named on the maps but undoubtedly many of the others have local names.

Eugenia Lake is the largest and most important in the Region. It is an artificially created reservoir for a Hydro-Electric Power Commission Plant located in the Beaver Valley. The lake covers an area of about 2.74 square miles, being about 2 miles wide and $2\frac{3}{4}$ miles long. The area draining into the lake covers 76 square miles and approximately 19,440 acre feet of water is stored in the reservoir. The powerhouse discharges an average daily flow of about 60 c.f.s. from its turbines under a head of 549 feet.

Mountain Lake is the second largest lake in the Region. It is about $1\frac{1}{2}$ miles long and averages 845 feet in width and has an area of 154 acres. Williams Lake with an area of 134 acres is the third largest in the area. Other lakes and ponds vary from a fraction of an acre to several acres in size.

TABLE 3 - Maximum Lateral Slopes to the Rivers, their Tributaries and other Creeks in the Region with their respective Drainage Areas

River and Creek Valleys	Height of valley slope	Horizontal Distance	Slope per Mile	Drainage Area
	Feet	Miles	Feet	Sq. Mi's.
Pottowatomi River	50	0.50	100	27.8
Maxwell Creek (near Owen Sound)	175	0.75	233	10.5
Sydenham River	100	0.40	250	44.3
Spey River	75	0.20	375	19.7
North Spey River	75	0.30	250	15.6
Bighead River	300	0.65	461	88.4
Minniehill Creek	175	0.13	1346	10.6
Rocklyn Creek	125	0.15	833	16.0
Walters Creek	200	0.50	400	17.4
Beaver River (near Eugenia Flume)	400	0.35	1140)	138.5
Beaver River (south of Heathcote)	625	1.90	329)	
Grier Creek	225	0.25	900	9.1
An unnamed Creek through Redwing	425	0.90	472	47.8
Wodehouse Creek	25	0.15	167	12.6
Boyne River	375	0.35	1071	27.1
Telfer Creek	250	0.70	357	25.9
Keefer Creek	100	0.20	500	10.7
Waterton Creek	100	0.32	312	22.9
Johnson Creek	125	0.55	227	6.6
Sucker Creek	250	0.85	294	13.4
Orchard Creek	225	0.70	321	5.4
Meaford Creek	75	0.10	750	1.9
East Meaford Creek	275	0.80	344	4.2
Indian Brook	450	1.35	333	15.5

The lateral slopes were determined from topographical sheets showing 25 foot contours and are approximate only.

Table 3

(d) Forest Cover, Swamps and Wet Scrub

Table 4 shows the wooded and wet scrub areas for the individual watersheds of the Region, together with the percentages of their respective drainage areas. The percentages of the dry forest cover areas, and the swamps and wet scrub areas, are shown separately since their run-off rates vary considerably.

The table shows that only 9.2 square miles or 1.4 per cent of the Region's total area is covered by wet scrub. Swamp area on the other hand covers 64.4 square miles, or 9.8 per cent of the total area; and the total dry forest cover is 98.6 square miles or 15.1 per cent. These total 26.3 per cent of the Region's area; that is 172.2 square miles or 110,208 acres are covered either by dry forest, swamps or wet scrub, whereas the forest cover for most watersheds in Southern Ontario varies from 7 to 12 per cent.

(e) Soils

Table 5 shows approximate percentages of the pervious and impervious soils in the Region, particularly for the Bighead River watershed since it was the only watershed so far on which a complete detailed soil survey has been made. The percentages of 66 and 85 for pervious and semi-pervious soils for the Region and the Bighead watershed respectively are considered to be high when compared with other drainage areas in Southern Ontario.

TABLE 4

Wooded and Wet Scrub Areas and their Percentages

Watershed	Drainage Area	Wooded Areas			Wet Scrub Areas	Percentage of Drainage Area	
		Dry Forest Cover	Swamp	Total		Dry Forest Cover	Swamp and wet scrub
	Sq. Mi.	Sq. Mi.	Sq. Mi.	Sq. Mi.	Sq. Mi.		
Sydenham River	79.6	9.5	11.1	20.6	2.8	12.4	18.1
*North Shore Area	119.1	17.4	8.6	26.0	1.0	14.6	8.1
**Beaver River	285.2	47.7	27.6	75.3	3.0	16.7	10.7
Pottawatomi River	38.3	5.7	5.3	11.0	0.7	14.9	15.7
Bighead River	132.3	18.3	11.8	30.1	1.7	13.5	10.0
North Grey Region	654.5	98.6	64.4	163.0	9.2	15.1	11.2

* Includes all streams north of the Bighead River from Owen Sound to Meaford

** Includes all streams east of Meaford

TABLE 4

TABLE 5

Estimated Relative Permeabilities of Soils in the Region and their Percentages

A. Bighead	Approximate Percentage
Highly Permeable; sand	5
Medium Permeability; medium till, coarse stony and bouldery till, kame moraine, limestone plain etc.	45
Low Permeability; shale plain, fine textured tills, clay and silt plains	50
Total	100
B. Remainder of the Region*	
High to Medium Permeability as above	65
Low Permeability as above	35
Total	100

* Based on a comparison with the Bighead area.

A section of the Bighead River at the proposed Oxmead damsite.

Headwaters of the Sydenham River at Williams Lake.

Aerial view showing the outlets of the Pottawatomi (left) and the Sydenham Rivers at Owen Sound.

CHAPTER 2

HISTORY OF FLOODING

An account of the floods of any part of the Province of Ontario, in order to be complete, should begin with a description of the conditions that existed in the primeval forest, before the coming of the white men. Unfortunately, such a description cannot now be written. However, evidence does indicate that flooding took place from time to time on many, perhaps on all, of the streams whose waters empty into the Great Lakes; but unfortunately there is no record of the frequency or the magnitude of such floods. The Indians kept no records, other than the traditions and the legends that were handed down by their story-tellers from one generation to another; no details of how often or how high the waters rose.

Furthermore, in relation to the Indian way of life, the periodic swelling of the streams and rivers was, in general, an advantage, and only infrequently a disaster. The flooding of the river flats enriched the Indian cornfields, and made them easier to clear and to cultivate. High water made travel much easier on many canoe routes and opened others which were impassable except when the low lands were flooded by a freshet. And when, with the advent of the white man, letters and diaries began to record the occurrence of floods, they tended to emphasize the inconvenience caused by "the rise of the waters" to those who travelled by land. Thus, in La Salle's account of his overland journey from the Detroit River to Niagara, in April 1680, he wrote:

> "The Indian and one of my men succumbed to the toil of walking continually in water, the constant rain and the great thaw having flooded all the woods."

More than one hundred years later, the Mohawk chief, Joseph Brant, being on his way from his home on the Grand River to York (Toronto), arrived at "The Head of the Lake", now Burlington Bay, and found his further progress hindered by floods:

> "the rise of the waters renders it unsafe for me to proceed".*

As one area after another in Upper Canada was opened to settlement, travel by land increased, and interruption of communications was mentioned more often. Surveyors were particularly subject to this inconvenience. They had to travel along straight lines back and forth across a township, and frequently recorded their difficulties in crossing swollen streams. or the delays they encountered as a result of the flooding of low grounds. From these entries and other similar sources we learn of the occurrence of a number of freshets, some of them severe, between 1790 and 1840.

The business of survey and settlement in the North Grey Region began in 1833; the first direct reference to a flood in the area is found more than twenty years later, in 1857. Throughout the western part of the Province, this was a year of unprecedented floods. On the Grand River, between the 16th and 19th of February, the destruction of property was immense: "It dwells not in the memory of any person now residing in Brantford, the remembrance of a freshet equal in its destructive effects to that of Tuesday morning last" (February 17th). In Grey County, where there was less valuable property to be affected, the principal damage was to bridges. The only account that has been found, published in the Toronto Leader of February 19th, provides no clear indication of the extent to which the waters rose.

> "We understand that the bridges over several of the small streams emptying into Lake Huron, between Collingwood and Owen Sound, have been carried away by the recent flood, and that the stages have been discontinued between these places in consequence."

This great and widespread flood was followed in North Grey by a period of twelve years, during which the records that have been found contain no references to high water in any of the streams of the area. It seems more likely that the

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* Letter Joseph Brant to D.W. Smith, December 15, 1797: Ontario Archives, Surveyor General's Letters Received, Vol. 7, Pages 49-50.

omission reflects the failure of the records to report the occurrence of floods, rather than that there were no freshets to record.

In the spring of 1869, severe floods were reported and much damage was done at various places in western Ontario. Two reports refer to the rivers of North Grey.

The Toronto Globe of April 21, 1869, carried a dispatch from Clarksburg, describing the flood in that village on the 20th:

> "This morning the Beaver River, which has been rising for several days, obtained a high point, overflowing its banks in the village of Clarksburg. It has made a new channel for itself in many places. The water on Clark Street is three feet deep, and the villagers are in great apprehension that they may have an untimely flitting."

Two days later, the Globe published a dispatch from Meaford, dated April 22nd:

> "On the night of the 20th Mr. Pardy's mill dam broke away, and coming down the river to the gravel road bridge carried it off. The only communication now is carried on by some boys with a ferry boat, except by travelling up to Pardy's bridge at the grist mill, a distance of a mile."

The dam referred to belonged to the grist mill of Jesse T. Purdy, and was located on Lot No. 15, Concession V, of the Township of St. Vincent. According to modern maps, the distance from the main street of the town, the modern Highway No. 26, to the site of Purdy's mill, is considerably less than a mile. The distance referred to in the dispatch may have been the total length of the necessary detour.

Clarksburg was again visited by a serious flood in April, 1875. The dispatch to the Globe was dated April 1st:

> "About Two o'clock this afternoon, the heavy jam above the bridge on Marsh Street was started, damaging the bridge considerably. The tremendous jam at Mr. Commings' saw mill started, and carried everything before it...........The waters rose from a depth of fifteen inches to over two feet on Marsh Street, the lower floor of several houses being completely covered. The channel of the river through the village is now all clear, bridges still standing, and danger is considered past."

According to the Toronto Globe, in a dispatch from Owen Sound, dated March 3, 1904, a flood had occurred in that town twenty years before. No other reference to such a flood has been found. "The bursting of this dam (Harrison's) in 1884 caused serious damage, and carried away the Baker street bridge."

Apart from the isolated occurrence of the flood of 1884 on the Sydenham River, there is an interval of twenty-six years between that of 1875, at Clarksburg, and the next one known to have been recorded, at Meaford, in 1901. It must once again be emphasized that, in all probability, times of high water have occurred on one or more of the streams of the Region, but that no reports of such occurrences have been found.

In 1901, the Toronto Globe regularly presented to its readers a front-page column in which the news of the day, more fully set forth in its ordinary news columns, was briefly summarized. On March 27, 1901, one such "news brief" was printed for which no corresponding dispatch could be found. The full account of the event referred to is accordingly missing. The "brief" reads:

> "During a flood at Meaford a scow was swept from its moorings in the river and carried against the lower iron bridge. Both bridge and scow were wrecked."

The situation described at Owen Sound in the dispatch of March 3, 1904, is rather one of a threat of flood than of actual damage: following an unusually heavy fall of snow, "the possibility of serious spring floods has already been anticipated. A large dam on the Sydenham above the Harrison Flour & Woollen Mills will be greatly strengthened, the contract having been awarded to-day." Whatever may have been the outcome of this "anticipation", the reader is not further informed; the threat probably passed without any damage being done.

The next serious flooding in North Grey took place at Flesherton, in the Township of Artemesia, on

January 4th, 1907, reported in the Globe of the 5th and of the 8th. Following a five-day thaw, three dams gave way in quick succession, and the large brick bridge over the Boyne River, a tributary of the Beaver River, was carried sixty yards downstream. The dams are identified as "the big dam at Boyd & Blakely's planing Mill", the dam at John Nuhn's woollen mill, and Louck's grist mill dam "a mile down the valley". The bridge at Louck's dam was also carried away.

> "The loss to the village is considerable....... the breaking of the dams takes the power from the planing mill, grist mill, and woollen mill. These three businesses brought much trade to the place."

On March 23, 1907, Owen Sound was visited by a violent thunder-storm, accompanied by heavy rain, which

> "was responsible for a great deal of inconvenience and some damage. The sewers were not able to carry it off, so it covered the streets, and flooded a good many cellars." (Owen Sound Sun, March 26, 1907)

In the account of this flooding by surface water in the streets, there is no indication that the rivers were swollen, or that they overflowed their banks.

In the first week of April 1912, there were widespread floods in Ontario, extending from the Bay of Quinte to the shores of Lake Huron. In North Grey, the Bighead River the Sydenham River, and the Pottawatomi River were affected. Long accounts of these floods appeared in the leading Toronto dailies and in various weekly newspapers throughout the Province. The passages quoted below are taken from the Toronto Globe, April 8, 1912.

> "Meaford, April 7, - There has been thousands of dollars' damage done here by the waters of the Big Head River. Both of the dams belonging to the Georgian Bay Milling and Power Co. have been swept away and the iron bridge near their flour mill is also gone and several rods of the street washed away. There is also danger of the dam at the Randle woollen mill giving way, and if it does the Syke Street bridge will likely go too. There have been some boathouses washed away, and likely more of them will be gone before morning. The town is in darkness, owing to the breaking of the dam at the power house."

The Bighead River in flood at Meaford April 1912.

Flood Damage at the mouth of the Bighead River in Meaford April 1912.

Flood waters of Hurricane Hazel, October 15, 1954, reached the window sills of these homes on Henry Street, Meaford.

"Owen Sound, April 7, - With five dams gone and a sixth threatening to go at any moment, the Sydenham and Pottawatami Rivers are putting up a record rampage today. At 3 o'clock the effect of the thaw of Friday and yesterday [April 5th and 6th] was supplemented by a heavy downpour of rain. The creeks and ditches in the country turned into torrents, and the rush of water was too great for the dam construction, which never contemplated such an extraordinary force. The dam at Inglis' Falls, three miles south of the town, which supplied power for Inglis' Flour Mills, gave way, the impact of an immense body of water came down against the dam at Harrison Mills, in the centre of the town, and loosened things up in an instant, allowing the water stored in the immense pond on the Sydenham to drop down into the lower levels, and through the harbor out into the bay. Along the bank small craft, including half a dozen motor boats, were swept like straws in the terrific current, piling them in kindling wood with logs and planks against Ninth Street bridge, a new wooden structure only erected last year. This soon gave way to the pressure, and was wrecked. The worst damage in the Sydenham was caused in the harbor below the new Tenth Street bridge. The current tore the big pile-driver scow away from its moorings, and it went down, upturning and striking the pleasure steamer Venetta on the bow, and carried her away to the opposite side of the harbor, where she jammed between the bows of two other larger vessels, and was wrecked and sunk. Other smaller steamers were scraped and torn by the pounding of floating timbers and great floes of ice.............The damage is not over yet, as the dam at the electric light station on the Sydenham River is in a precarious condition, and if it lets go immense damage may be added to that already incurred."

"Over in the Pottawatomi, which empties into the bay on the west side of the town, the damage is more serious. On this river are Wright's Oatmeal Mill, Nicoll's Planing Factory and Sawmill, and Wright's Flour Mill. The dam at the Oatmeal Mill gave way first, and in the rush of water the Nicolls dam gave way, allowing the water from the two immense ponds to come down on the flour mill. The dam stood the full force, but an embankment south of the mill was swept away as if made of sawdust. The south side of the mill, in which were stored large quantities of millstuff, gave way, and fell over into the newly made watercourse. The power house, which the steam plant used to supplement the waterpower in dry weather, was also wrecked. The damage is estimated at about ten thousand dollars at the mill alone."

The Toronto Mail and Empire of the same date, April 8th, 1912, summarizes the damage at Owen Sound in a few words:

"The harbor strewn with wreckage of small craft, logs, trees, stumps and timber swirling around as though in a maelstrom, undermined buildings and damaged bridges, is the tale of Owen Sound's worst flood experience."

Following the great damage occasioned by the floods of 1912, there is an interval of fourteen years in which

no reference to flooding in the Region has been found. The next known flood occurred on April 22-23, 1926. The following partial account is taken from the Owen Sound Sun-Times, of the same date.

> "The Sydenham River is on the rampage again due to the arrival of the mild weather with the consequent melting of the large quantities of snow along its banks, with the result that thousands of dollars worth of damage has been done to property, and the water continues to flow at a rapid rate, although it is anticipated that the worst is over and that no more damage will be done.
>
> "It was not until Thursday afternoon /April 22nd/.... that there was any apprehension that the river might overflow its banks or that damage might be done at Harrison's dam, but as the day progressed it was apparent that if immediate action was not taken to relieve the pressure there would be serious results.
>
> "The water rose so rapidly in the afternoon that the spillway of the new concrete dam... could not begin to take care of the immense volume of water coming down, and ways and means had to be devised to get it away. ...It was evident that the big grist mill would be undermined by the water if some means of relief could not be devised......A large hole was cut on the left side (of the flume) which diverted the water to the extent that the pressure on the mill was relieved."

In a complicated series of causes and effects, the diversion of water from the flume led to the washing away of a large part of the river-bank, to the carrying away of a temporary foot-bridge, to the collapse of a large frame barn, and to serious damage to the Ninth Street bridge. Wreckage was strewn along the river-banks from Harrison's dam to the harbour. "The whole affair is a very costly one for Harrison Bros., as it will be several months before they can secure a sufficient flow of water into the flume to furnish them with power enough to operate their mills."

Two years later, March 26, 1928, a dispatch to the Toronto Mail & Empire reported a flood at Owen Sound of much less severity than than of 1926.

> "Drifting logs and roots of trees carried down by the flood waters of the Sydenham River for a time threatened Ninth Street bridge this morning. The bridge had to be closed to traffic, while a Board of Works gang removed the debris. The river, now at its greatest height during Spring floods, has not done any damage."

The same dispatch mentions that the Harrison Dam, washed out out two years ago, "has never been rebuilt."

During the night of April 5-6, 1929, the town of Meaford experienced a spectacular electrical storm accompanied by a heavy down-pour of rain, which caused the small creek in the southeast part of the town, called Meaford, or Captain's Creek to overflow. The resulting flood was reported in the Owen Sound Sun-Times of April 6th.

> "Some distance southeast of Big Head River, in a section of the town formerly known as 'Purdy Town', is a little stream that leisurely ambles over its stony bed down through the town by way of the Knight Manufacturing Plant. Swollen to unusual proportions it suddenly went wild and rushed madly over private property, through gardens, over lawns, and ran down St. Vincent street like a miniature Mississippi. At 10:30 p.m. the flood still prevailed."

The Sun-Times also reported considerable damage to the tracks of the Canadian National Railway, near Meaford: part of the road-bed washed out, a culvert damaged, and many ties missing. Trains were imperilled and delayed but no serious accident occurred.

At Owen Sound the heavy rains continued throughout Saturday, April 6th, and over the week-end. The waters of the Sydenham River rose to a higher level than had been reached in many years. On Monday, the 8th the Sun-Times reported the damage done.

> "The worst floods to have been experienced in Harrison Park for a great many years, did a great deal of damage to the park. In many places the river, changed into a raging torrent, entirely left its course, washing out parts of the park, and doing considerable damage. The north end of the park, where iron swings have been erected, was literally a rushing torrent, the waters flooding the entire strip of land, doing damage to several small buildings, rooting up trees, and doing further damage."

> "With the exception of the one at the south end of the park the bridges escaped any apparent damage. However, this one bridge was rendered in a dangerous condition by washouts at each side of it."

> "The general flooding of the river was felt along the entire course, and many of the lower falls along it were flooded. For a time the dam at Inglis Falls was thought to be in danger, but this danger is understood to be over again. At one time there was as much as three inches of water pouring over the dam walls, while there was the greatest volume of water pouring over the Falls in many years."

In February 1930, the Sydenham River threatened to flood in the neighbourhood of Owen Sound but the threat ended without causing any actual damage. For several days, about the middle of the month, mild weather caused the rapid melting of unusually large accumulations of snow. The river became considerably swollen, and the precaution was taken of letting a good deal of water out of the various dams on the Sydenham. "W.A. Inglis and Sons, whose mill is situated at Inglis Falls, partly opened their dam Friday morning [February 21st]. About half the stop logs were taken out............to insure safety to their dam."

> "There is still a considerable quantity of ice along the river course, while much snow remains along the banks. With the clearing of bush from the river banks the snow melts more quickly, thus making the flood danger greater."

Two years later, in February 1932, the Sydenham River was again running high; but the Owen Sound Sun-Times described it more as a scenic attraction than as a threat of danger. On Friday, February 12th,

> "the effect is wonderful to behold, and anyone who can possibly find the time should pay a visit to [Inglis] falls before the water goes down........."

There was, however some cause for concern. "North of the Inn the whole of the park, with the exception of that part where the picnic parties are usually held, is under water, and trees are carried away in some sections..........There will be some damage to the park, but it will not be extensive." Many fields in the vicinity of Owen Sound were flooded; and, in the city, some damage resulted from the flooding of "cellars, back yards, and driveways." "Some of the farmers state that they never saw conditions so bad as they were on Thursday."

The threat of flood, reported in the Owen Sound Sun-Times on March 5, 1934, was even less than that of 1932. The chief subject of concern in 1934 was a "giant ice mountain" poised on the brink of Inglis Falls, and "doomed by approaching spring."

> "An ice jam below the falls seems probable. However, as there is nothing in the gorge which can be harmed by the waters, the net result should be another glorious spectacle. There is unlikely to be sufficient water to carry the huge ice blocks further down, where a flood would do much harm."

During the first week in February 1938, there were again widespread floods in Ontario. In North Grey, however, their effects appear to have been of a minor nature. The heavy rains of February 5th and 6th raised the waters of the Beaver River, and brought a threat of floods to Clarksburg and Thornbury. Dynamite was used to break up an ice jam, and the danger of damage to the dam was averted. A report published in the Toronto Globe, February 7th, stated that "several acres of land were flooded at Meaford." This seems to have been the extent of the damage done.

Both the Bighead and the Beaver Rivers were affected by the mild weather of March, 1939, that "sent creeks and rivers on the rampage in many parts of Ontario." The conditions at Meaford and at Thornbury were reported in the Sun-Times of Monday, March 27, 1939.

> "The Big Head River ......is now clear of ice right down to the bridge which crosses as the river merges into the harbor. For a time on Sunday it looked as though there might be some damage done, but as the day wore on this danger disappeared. The river ice piled up four or five feet deep just south of the bridge, where the harbor ice held solidly, but there was free passage for the water under the ice, and there was no flooding at that point."

> "Highway travel was hampered when streams ran over roadways and flooded the highway between Meaford and Thornbury."

> "Waters of the Beaver River, which runs through the heart of /Thornbury/, receded today and residents believed that danger of more serious floods was past.......... Residents said flood dangers had not been as serious in the past 15 years as yesterday when the river rose four to six feet above normal. The river flowed at a terrific rate when workmen removed heavy timbers from a dam to allow raging waters to escape into the bay.............A 50-foot wooden bridge was partly washed away. Hundreds of persons watched the flooding waters for hours yesterday and last night, then returned home as the water began gradually to recede."

After 1939, there followed several years in which no reports of flooding have been found. That there was some

flooding on the Bighead River in 1946, is indicated by a Meaford dispatch in the Owen Sound Sun-Times of April 12, 1947, which refers to "the heavy floods of last year"; but no contemporary account of the 1946 floods is known.

The Bighead River rose at Meaford three or four feet over the week-end of April 5-6, 1947, but by Monday, the 7th had receded without doing any damage. "The water's rise was not even up to the average spring level." It had been a week-end of heavy rain; a return of colder weather held the run-off in check. Four days later, another rise in the temperature accompanied by further rain, according to the Sun-Times of April 12th:

> "brought flood waters in almost record volume to the Big Head River, which empties into Georgian Bay at Meaford. Swirling flood waters in the past 24 hours have done heavy damage to the north bank of the river just east of the main street concrete bridge. Fully three quarters of the roadway which formerly ran along the north bank of the river at this point has been washed away."

> "The Big Head started to rise dangerously about noon on Friday /April 11th/, and great crowds of Meaford people watched as the river crumbled foot after foot of the bank situated almost in the heart of Meaford."

> "Saturday morning, it was believed the crest of the flood had been reached, and the river level was beginning to drop."

At the same time, the Sydenham River at Owen Sound was also in flood and threatened to wash out the dam at the foot of Fifth Street East, and to undermine the Owen Sound Woollen Mills. Both the dam and the mills were saved by the all-night exertions of the Board of Works, the firemen, the police and voluntary crews of private citizens, who built up the dam some two feet in height with sand-bags. Their combined efforts averted serious actual damage. In several parts of the city minor damage was reported. Several homes at Inglis Falls were surrounded by flood waters but the bridge at that point was not considered to be endangered.

> "The Beaver river has not caused the slightest trouble at Thornbury this spring, beyond flooding a few cellars. Although it was high over the week-end, the river remained between its banks in the Thornbury-Clarksburg area, and residents consider this spring

Sydenham River at Harrison Park, Owen Sound, flowing bank-full, April 1947.

Inglis Falls on Sydenham River at height of spring run-off, April 1947.

Inglis Falls in August, 1958.

> to be the best year yet so far as the water getting away without trouble is concerned. The swollen river rushed over the power dam Sunday /April 13th/ in great volume, but caused no damage, and no danger was created for the dam."

A more serious threat to Meaford arose on March 16, 1948, when the Bighead River piled up one of the worst ice jams in the town's history. As reported in the Owen Sound Sun-Times, March 17th:

> "The danger of serious flooding in Meaford is over for the moment, but may arise again at any time. Cooler weather on Tuesday night /the 16th/ and early Wednesday morning cut the volume of water, but a huge ice jam still extends along the Big Head River from the old Randall Dam, south of the Sykes Street bridge, to the mouth of the harbor."

Many residents of Meaford claimed that "the present jam is the worst they have ever seen." A derrick and hammer was used in an effort to release the jam, and with some measure of success. The rampaging waters swept along a road on the north bank of the river in the town. Several basements, and the boiler-room of the Meaford Woollens Company were flooded, and considerable damage was done to the property.

A few days later, over the week-end of March 20-22, 1948, the Sydenham River threatened to cause floods in Owen Sound but once again no serious damage resulted. Mild weather, the breaking up of the ice on the river, and the melting of much snow throughout the watershed, had swollen the waters to an extent that endangered the dam at the Owen Sound Woollen Mills, and overflowed the dam and the roads at Inglis Falls.

By Monday, the 22nd, most observers considered that the danger was past. The Sun-Times of that date quoted the manager of the woollen mills: "At present, conditions at the Mill Dam are fine; the waters at the dam having gone down a good six inches since Saturday."

> "At Harrison Park and at Inglis Falls, the waters were slowly receding on Monday morning."

> "At Harrison Park........conditions were much improved since Saturday. The water has gone down considerably, although there is still a little coming over the roadway. One small foot-bridge.... has been washed away."

"Farther up the Sydenham river in the Jubilee Bridge area, the waters have dropped considerably. One resident....estimates that the river height is down at least two feet since the Saturday peak."

A storm that caused floods throughout Ontario, on April 4, 1950, is reported to have been felt on the Boyne River, at Flesherton, where it threatened but apparently did not damage the dams on that stream. The Toronto Globe & Mail, of April 6th, reports also some damage to the roads between Walters Falls and Meaford along the course of the Bighead River; but by the time the dispatch was sent, "...ers in the area have dropped from danger levels."

In 1954, there occurred a protracted period of almost continuous thaw and minor flooding, from February 15th to the first week in March, marked by reports of flooded roads and cellars in many parts of the Province. In North Grey, such reports referred chiefly to flooding in the vicinity of the Beaver and Bighead Rivers, and indicated that only a moderate amount of damage was sustained. According to the Meaford Express of February 18th:

"Globe Mills, one of Meaford's largest employers of labor, was forced to shut down for several days when waters of the Big Head River backed up into the basement, damaging stock and machinery. Meaford curlers were compelled to discontinue curling Monday night and hoist their machinery off the floor to keep it free of water forced into the basement."

"Cellars were flooded and some householders with furnaces in the basement were left without heat. Water flowed down from the hills in streams."

"Between Collingwood and Thornbury the tracks were under ten inches of water in four places, and the train was ordered to run dead slow over the dangerous spots."

"Heathcote district was hit hard when Mill Creek, a tributary of the Beaver River, flooded over its banks and flowed down the road.......The Kimberley Road, between Heathcote and Kimberley, was impassable Tuesday /February 16th/ because of water covered sections. Cellars in the district were flooded to a depth of four feet in places."

To this, the Thorbury Review-Herald, of the same date, adds:

"Ice jams were reported above the dams at both Clarksburg and Thornbury. Blasting was resorted to, yesterday, to relieve pressure. In Meaford, expectancy of flood conditions decided the Globe

Textile Mills authorities to remove $100,000 of manufactured cloth in the mill at south bank of river, to the first story. When the jam let go it was level to the new pier, and cars along the way beat a retreat for fear the big cakes of ice would spill over the bank."

On October 15th, 1954, the tropical storm called "Hurricane Hazel" reached Ontario, and by high winds and unprecedented rainfall, caused enormous damage throughout the western part of the Province.

In Owen Sound, according to the Sun-Times of Saturday, October 16th, 3.26 inches of rain fell in a 24-hour period. In all parts of the city cellars and basements were flooded, and streets were under torrents of water which the storm-sewer system was unable to carry away. Although it was expected that the Sydenham River would rise and every possible precaution was taken to meet such a situation, it was gratifying to find that the river did not materially contribute to the damage.

At Leith, "the river, flowing as high as in the spring break-up, brought down a wrack of broken trees and driftwood."

The Meaford Express of October 21st, reported damage in that town estimated between $15,000 and $25,000.

"The Big Head River, usually well behaved except during spring ice and floods, tore fiercely at its banks, gouging out huge chunks as it hurried toward the Bay. Bridges along its route were imperilled. The Bake Shop bridge floorboards were missed by inches, and the Sykes Street bridge supports were given a real tryout as the restless surging water pulsed to the bay. At the turn beyond the bridge the water forced its way over the old river bottom filling the pit occupied by the Coleman cement block company."

"Damage reported to date includes $2000 to warehouse stock of Knights of Meaford, $2500 to marine railway gas tanks and storage at the Richardson Boat works, $1750 to stock at Coleman Tile, $2500 to McLagen Furniture Co. stock $50 at Amerock, and $750 to moving equipment at Globe Mills. It will cost the town between $2000 and $2300 to repair damage to streets.........Basements throughout the town were flooded and damage there is estimated at several thousand dollars."

So far as the contemporary reports are reliable there were no fatalities in the North Grey Region; and while

judged by comparison with earlier floods in the same area, the estimates of damage are considerable, yet, when they are compared with the known losses in other hard-hit parts of the Province, it becomes apparent that North Grey escaped with relatively light losses.

There has been only one occasion, since "Hurricane Hazel", when floods have visited the North Grey Region. On April 24, 1957, excessive surface water flooded some of the streets of Owen Sound, clogged the storm sewers, and flooded basements. The damage done was slight.

CHAPTER 3

WATER PROBLEMS

1. The Low Flow Problem

(a) Summary of the Flow Records

The need for reliable stream gauging stations located at strategic points on the major rivers in the watershed cannot be emphasized too strongly. Flow records are needed to determine the maximum and minimum flows which could occur in a particular river in order to safely and efficiently design dam spillways, channel improvements or diversions, or the amount of supplemental flow required to dilute efficiently sewage effluents and maintain a desirable stream flow. Five years of reliable records is the absolute minimum required for a working basis for computations, while ten to fifteen years is generally considered as being necessary. The longer the period of reliable records available, the more accurate will be the computed maximum and minimum flows for a storm of a particular intensity.

At the present time, it is impossible to determine these flows accurately for the Beaver and Bighead Rivers since reliable records for these rivers only date from 1957. On the Sydenham River, however, records were first started in 1915 and although no records were taken between 1926 and 1945, there is a total of twenty-five years of records available. These have been used to study the low-flow problem at Owen Sound and its effect on the pollution of the river by sewage effluents.

Table 8 shows the maximum, minimum mean daily and mean monthly flows at each of the gauges located on the Sydenham, Beaver and Bighead Rivers respectively. The location of these gauges is shown in Figure 1. A summary of this table indicates that the Sydenham River usually reaches its lowest flow during the late summer and early autumn. August usually has the lowest flow followed by September, July, October and June in that order. The lowest minimum flow occurred in both 1952 and 1954 during the month of August, when only 1 c.f.s. was recorded. The corresponding mean flows for those months

were 9 c.f.s. and 11 c.f.s. respectively. The lowest mean monthly flow recorded is 5 c.f.s. which has occurred three times in 1948, 1949 and 1955, all during the month of September. The most pronounced period of low flow was the period from July 1949 to February 1950 when the monthly mean flows varied from 5 c.f.s. to 15 c.f.s. and the average mean monthly flow for the period was 9.7 c.f.s. The overall average mean monthly flow for the period from July to February for the twenty-five years of records is 43.3 c.f.s., while the average mean flow for every month recorded during the entire twenty-five years is 93.8 c.f.s. It is interesting to note from the mean monthly flow tables that for the period from March to May the average mean flow is 244 c.f.s., 254 c.f.s. and 95 c.f.s. respectively. This amounts to 36,258 acre feet of water which each year, on the average, will flow into the lake during this three-month period. This is equivalent to 9,843,000,000 gallons of water, which would supply Owen Sound at its present rate of consumption for almost 11 years.

(b) <u>The Pollution Problem</u>

There are basically two kinds of pollution effects; namely, those affecting public health and those which are not a danger to humans but which are offensive to people or harmful to stock, wildlife or fish and other aquatic organisms. The first type can usually be measured by the concentrate of the indicator organism, bacillus <u>E. coli.</u> The second type is measured in terms of poisinous compound which may be introduced into the river and in terms of oxygen depletion and the oxygen demand (B.O.D.*). Silting has additional effects, while shifting sand bottoms are virtual aquatic deserts.** Silt from fertile land may occasionally fertilize the water and thereby promote an

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* B.O.D. means Biochemical Oxygen Demand, which is a measure of the oxygen that will be demanded by the material in the course of its complete oxidation biochemically. It is determined wholly by the availability of the material as a bacterial food and by the amount of oxygen utilized by the bacteria during its oxidation.

** Tarswell, C.M. and Gaufin, A.R., "Some Important Biological Effects of Pollution Often Disregarded in Stream Surveys". Proceedings of the 8th Industrial Waste Conference, 1953, Purdue University U.S.A.

[illegible]

[illegible] Pollution Problem

[illegible] affecting public health [illegible] *E. coli* [illegible]

[illegible]

unsightly growth of algae. More often, however, the silt will cover the normal bottom fauna and destroy the stream for fish. Colloidal clay prevents light penetration and retards the growth of aquatic organisms which results in the water becoming unsightly and undesirable for swimming.

The most common type of pollution is caused by the discharge of wastes containing dissolved or suspended organic compounds. Domestic sewage and most industrial waste are predominantly of this type. One of the chief symptoms of a polluted stream is a shortage of oxygen in the water, which is caused by certain bacteria and other organisms decomposing the organic compounds by consuming the organic solids and combining them with oxygen.

Aerobic decomposition of any organic compounds in the water will take place providing the water contains an ample amount of dissolved oxygen. This will finally result in the formation of compounds such as carbon dioxide, water nitrates and sulphates†, and the depletion of the oxygen dissolved in the water. Being comparatively stable, these compounds exert no further demand for oxygen, produce no foul odours, and do not cause a septic condition in the water. However, they do fertilize the water and stimulate the growth of plant and animal life in the stream. Thus, dense growths of green algae are normally a sign that the stream is recovering from organic pollution.

Should there be an absence of dissolved oxygen in the water then "anaerobic decomposition" of the organic wastes will take place. Oxygen is then consumed from the organic materials and in so doing compounds such as methane gas, hydrogen sulphide gas, ammonia and others having little or no oxygen are

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† Proper treatment of sewage wastes should include two phases, primary treatment (mechanical removal of most solids) and secondary treatment (digestion of the remainder by aerobic decomposition, as herein described).

produced. Many of these products have highly disagreeable odours which are typical of polluted waters. Sometimes the decomposition products are lethal to fish and other aquatic organisms, although more often they die due to a lack of oxygen.

Since the amount of oxygen which water can dissolve is small (less than 15 parts of oxygen per million parts of water* by weight), sewage treatment facilities should be so designed as to discharge an effluent which is already at least partially decomposed biologically. This will result in less oxygen being removed from the stream's oxygen reserves.

Apart from bacterial pollution, the types and abundance of both plant and animal species in a stream provide an excellent measure of the condition of the water. At the one extreme, a severely polluted water may contain extensive growths of gray-brown fungi, vast numbers of scavenger types of bottom-feeding organisms, a great bacterial population (or a sterile condition), and little or no dissolved oxygen. At the other extreme, clean water will support green algae, insect larvae, snails, clams, game fish and other organisms requiring abundant oxygen.

The time and distance required for the recovery of a polluted stream depend on many factors, such as the temperature and volume of flow of the water, the type of pollutant, the type of stream bed and types of obstructions such as dams which serve to aerate the water. A full report on pollution in the North Grey Region would require the following investigations being carried out.

(i) Bacterial plate counts at all points suspected of bacterial pollution, and at regular space intervals in the courses of the various streams.

(ii) Measurement of the oxygen content in bacterially

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* Oxygen content of streams varies inversely as the temperature of the water. Thus in the summer months when the water temperatures are highest the amount of dissolved oxygen available for decomposition of wastes is lowest.

polluted sections and where industrial wastes enter the streams, with additional measurements of the Biochemical Oxygen Demand below sources of industrial and bacterial pollution in order to estimate the rate of recovery of the streams.

(iii) Measurement of the amount of silting and turbidity, and their effects on the life of the streams.

(iv) The assessment of all the present pollution sources by relating the estimated minimum stream flow to the maximum flow of the effluent (provided that these can occur at the same time).

At the present time there are no sewage treatment plants in the North Grey Region and much of the raw domestic sewage is discharged directly into the rivers and harbours. During low-flow periods sections of the rivers are in a heavily polluted state which, besides producing foul odours and being a nuisance to the nearby residential and commercial sections is dangerous to the health of the communities.

The Ontario Water Resources Commission has the responsibility of protecting the lakes and rivers of the Province from pollution and will investigate such problems upon request. The Commission has investigated the pollution at the mouth of the Sydenham River and the results of this survey are given in the report "Owen Sound Bay Pollution Survey", published in 1958.

(c) Supplemental Stream Flow

In the absence of any accurate data on tests made of the oxygen content or B.O.D. of the water and bacterial counts, it is impossible at the present time to determine the exact amount of diluting water required to prevent any nuisance arising from the sewage entering the rivers and harbours.

There are a number of comparatively good reservoir sites on the Sydenham River above Owen Sound which would provide as much as 20,000 acre feet of storage, depending upon the sites selected and the height of dams constructed. Most of this storage could be used to supplement the stream flow throughout the dry summer months. Fifteen thousand acre feet of storage would provide a flow of 75 c.f.s. for 100 days which would substantially

improve the river particularly during periods similar to August 1952 and 1954 when the natural stream flow was only 1 c.f.s. This amount of storage would greatly relieve the pollution problem on the Sydenham River but would not eliminate it completely, nor could it provide any immediate relief since reservoir projects require several years to complete.

Although the pollution problem would be effectively remedied with the construction of treatment plants, there will still remain the problem of the poor condition of the rivers during periods of low flows. Backwater areas and stagnant pools will produce growths of algae, and the recreational areas in the vicinity of these areas will lose much of their beauty and attraction. It is felt, therefore, that supplemental flow during these periods would greatly benefit those who wish to use the rivers and adjacent areas.

2. <u>The Sedimentation of Meaford Harbour</u>

(a) <u>General</u>

Meaford is located on the southern shore of Georgian Bay on Highway 26, midway between Owen Sound and Collingwood. A little more than 125 years ago the present townsite was a tangled mass of brushwood, when Charles Rankin landed at the mouth of the Bighead River while engaged in the first survey of Grey County, that of the Township of St. Vincent in 1833.

The first settlement occurred in 1839 and the Government laid out the townsite in 1845. In 1846, Jesse Purdy erected the first grist mill, south of the townsite, and with an increase in small industries the village became an incorporated town in 1875. The population has since grown to 3,640*. The existing industries manufacture a variety of products, including hardware, textiles, furniture, boats, building supplies and steel products. The surrounding agricultural land produces beef and dairy products and is also very well suited for the production of apples.

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* 1959 Municipal Directory, Department of Municipal Affairs.

In recent years there has been an increase in the amount of tourist traffic passing through the town and this is likely to continue as the population of Ontario grows and as the North Grey Region becomes more popular as a tourist area.

The harbour at Meaford has played a large part in its development since the first recorded dredging, which occurred in 1877. This operation cost only $250. However, during the past 82 years almost $426,000 has been spent on 34 dredging operations. These have gradually enlarged and deepened the harbour until today there is almost 2,300 feet of wharf space, and with an average depth of approximately 17 feet it is capable of handling boats carrying up to 2,700 tons.

Until 1938 the Meaford harbour would register an average of approximately 30 boats a year. These would include the Dominion Transportation boats, coal boats and tugs with scows loaded with lumber, etc. The peak of the traffic occurred in 1923,and 1924 when a variety of boats made 83 and 68 calls respectively. This was due to the large quantities of lumber which were being brought to Meaford at that time.

During the past fifteen years, however, the amount of shipping entering the harbour has declined considerably and now consists mainly of one to three calls per annum by coal boats which unload from 2,300 to 4,500 tons of coal. Apart from this traffic, a German boat from the port of Kiel delivered a load of interlocking steel piling required for harbour construction during 1954. During the same year, a tug and scow entered the harbour in order to avoid Hurricane Hazel.

Aside from the commercial traffic, there have been from three to six pleasure-cruisers, ranging from 24 to 40 feet in length, calling in at Meaford during the past three or four years. It is most likely that this type of traffic will steadily increase as this form of recreation becomes more common and as the area becomes more popular with the boating public. Since Meaford has suitable facilities for pleasure craft, it is felt that steps should be taken to ensure that this asset is fully protected.

(b) The Amount of Sediment

The exact sediment load of the Bighead River at various stages has not yet been measured. To do this would require the construction of flow-measuring weirs and settling traps and also taking turbidity and suspended load tests. However, interesting figures have been determined by examining the records of the dredging operations in the Meaford harbour and also the maps of the harbour.

From a map made in 1899 the size of the harbour was determined from a series of soundings made at that time. The area covered 10.6 acres (51,420 square yards) and the mean depth was 12.3 feet (4.1 yards), which gives a volume of 210,823 cubic yards. From a similar map drawn in 1958 after the recent dredgings, the harbour was 17.28 acres (83,635 square yards) in area and had a mean depth of 16.7 feet (5.56 yards). The volume, therefore, amounted to 465,012 cubic yards. From these two volumes it was determined that 254,189 cubic yards (465,012-210,823) of material was dredged from the harbour basin in enlarging and deepening operations.

Since 1899, there have been a total of 22 dredging operations recorded. Unfortunately, the amount of material excavated was recorded for only 18 of these operations and totalled 721,620 cubic yards at a cost of $360,814. This gives an average unit cost of 50 cents per cubic yard.

A total of $43,101.78 was spent on the four dredgings which had no quantities recorded. Assuming the unit cost to be 50 cents per cubic yard, the amount of material removed would be $\frac{43,101.78}{.50}$ = 86,203 cubic yards. The total amount of material dredged during the 22 operations, therefore, is estimated as (721,620 + 86,203) = 807.823 cubic yards. Since the volume of the harbour has only been enlarged by 254,189 cubic yards since 1899, then the amount of sediment dredged equals 553,634 cubic yards (807,823 - 254,189). This is equivalent to 342 acre feet of sediment or a volume of soil which would cover 684 acres of land to a depth of six inches.

The actual amount of erosion which is occurring on the Bighead River Watershed is no doubt in excess of the amount indicated above. The material dredged from the harbour represents the heavier particles which were dropped by the river as it flowed through the harbour basin. Many thousands of cubic yards of finer materials have been swept through the harbour and into Georgian Bay, especially during flood flows when the velocity of the river is sufficient to carry most of the sediment through the harbour into the deeper water beyond. This has no doubt been seen during flood when the lake becomes muddy in the vicinity of the river mouth.

Although to the casual observer, soil erosion might not appear to be a vital problem in the watershed, studies such as these indicate that it is occurring and in some cases at quite an alarming rate. It is not suggested, however, that the erosion should, or could, be eliminated completely. To do this would require an effort and expenditure beyond all reasonable proportions. It is possible, however, to reduce the existing erosion rates considerably by proper land use and forestry practices.

(c) <u>The Source of the Sediment</u>

A preliminary visual survey was made of parts of the watershed, with the aid of aerial photographs and topographic maps, to determine where the sediment originates and the extent of the erosion. This was done in co-operation with the Land Use Section and with the aid of their survey data.

It was found that approximately 28 per cent and 51 per cent of the drainage area is covered by forests and pasture respectively, with the remainder being either cultivated (18.7 per cent) or used for non-agricultural purposes (2.3 per cent). Approximately 25 per cent of the watershed has slopes in excess of 10 per cent. Steep slopes and poor land use practices have resulted in three per cent of the watershed being seriously eroded. This represents an area of almost 2,400 acres which has lost more than two-thirds of the topsoil. This erosion is confined to sheet erosion and does not include the material

which has been scoured from the beds and banks of the streams and rivers or the erosion in roadside ditches. The sheet and rill erosion has resulted mainly from poor farming practices such as lack of contour ploughing and crop rotation, overgrazing, and the clearing of land which should have remained as forest. This is especially noticeable in the area lying to the south of Meaford and westward to the Minniehill Creek (Figure 3) and it is believed that this is the source of some of the finer material which is eventually deposited in the Meaford Harbour or Georgian Bay.

Another major source of sediment is the stream channels of the river and its tributaries. This is especially true in the case of the latter where stream gradients vary anywhere from 40 to 190 feet per mile, as can be seen from the water level profiles and gradient tables which appear in Figure 2 (b). Special attention is drawn to Tributary A and Minniehill Creek which drain the eroded area mentioned in the preceding paragraph. An examination of these stream beds revealed much scouring of the till and beach material which makes up most of the unconsolidated materials of the watershed. On some of the tributaries scouring has eroded this material down to the bedrock, a condition which is especially true of the lower three miles of the Bighead River. In a distance of 12½ miles downstream from Bognor, the river bed drops only 70 feet, an average gradient of only 5.6 feet per mile. The gradient then changes to 42.5 feet per mile for the final three miles of the river's course, which results in greatly increased velocities and scouring. This is evident from the large number of shifting sand and gravel bars which exist in the river's bed, and erosion scars on the river's banks. This material is gradually washed down the river until it finally settles either in the Meaford Harbour or Georgian Bay. From borings made in 1901 it is known that at that time there existed deposits of clay, sand and gravel in the mouth of the Bighead River varying from two feet to 12 feet in depth. Since then, records which have been kept of the subsequent dredging operations

during the past 58 years show that clay, sand, gravel and even boulders were removed from the harbour.

There is little doubt that the river will continue to deposit large quantities of soil and gravel in the harbour and the bay unless steps are taken to reduce the amount of erosion on agricultural lands within the watershed and also the magnitude of the peak flood flows which are chiefly responsible for the erosion in the bottomlands.

(d) Remedial Measures

(1) General

There are various types of soil erosion which can be caused by the flow of water, viz., sheet erosion, rill erosion and gully and channel erosion. Sources of sediment are classified and measured according to which type of erosion is occurring. The rate of erosion depends on the particular soil; the degree and length of slope; the intensity, duration and frequency of rainfall; the velocity and duration of stream flow and the type of land use.*

Different soil types have different inherent rates of erosion which result from the presence of organic matter, colloids and depths to a less pervious stratum. The soil types have been classified and their inherent erosion qualities can be determined by laboratory and controlled field tests.

The length of slope, the degree of slope and the intensity, duration and frequency of rainfall are all functions of the erosion qualities of any particular field. Results of plot measurements show that erosion varies with the 1.35 power of the degree of slope expressed in percentage; the 0.35 power of and length of slope expressed in feet; and the 1.75 power of the maximum annual 30-minute rainfall expressed in inches.

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* Valleys and Hills, Erosion and Sedimentation, by L.S. Gottschalk and Victor H. Jones, U.S.D.A. Year Book, Water, 1955.

The most important factor influencing the amount of soil erosion, however, is the cover protection provided to the soil by varying land use practices. Land use is a very broad term and includes the uses to which a farmer puts tillable land, pastures, woodlots and natural forest land, as well as the uses to which the land developer puts land located within urban areas. The table below indicates the effect land use has on the amount of soil erosion occurring on farm land.

THE EFFECT OF FARM LAND USE ON SOIL EROSION

(Average of five years; on a 10-per cent slope; up-and-down cultivation for May - October; average rainfall 20.1 inches; clay soil.).

Central Experimental Farm, Ottawa

Crop	Soil Losses in Tons per Acre
Summer fallow	26.5
Corn	27.3
Oats	0.7
Alfalfa	0.1

(2) Control of Agricultural Land Erosion

The above table indicates the tremendously contrasting rates of soil erosion which result from varying land use practices on a particular field. Varying soil types and topographic features add to the complexity of the problem and make it impossible to establish a rule-of-thumb method of combating erosion. Although there is no one remedy or combination of remedies that can be universally applied, there are a number of basic principles of erosion control which have a widespread application. These are:-

a Reduce the velocity of the run-off water.

b Increase the infiltration of water.

c Absorb the energy of raindrops.

These can be applied to each individual farm by having it thoroughly studied and a correct land use plan drawn up and put into operation. This service is available through the Ontario Department of Agriculture.

It is felt, however, that if any real program to combat soil erosion on the Bighead Watershed (and subsequently reduce the amount of sedimentation of the Meaford harbour) is to be a success, it will require a sense of common interest and mutual concern of all the residents living within its boundaries. It will also require the active support and co-operation of all the individual landowners concerned which, in this case, would apply to several hundreds of persons. These points cannot be emphasized too strongly. This type of program involves working with, and in some cases against, the forces of nature and endeavouring to correct the damage which has occurred over a period of many years. It requires a great community spirit if the job is to be well done.

It is because of these requirements that the establishment of the "small watershed" or "little valley" program is recommended. This consists of a co-ordinated program of correct use and development of soil and water resources on all the farms located within a small drainage area, usually a tributary of the main river. In this way a more positive action toward erosion control and land improvement will result, without the project becoming too cumbersome due to too many landowners being involved. Besides, the individuals concerned would be neighbours with common interests which, it is hoped, would result in more co-operation. If enough of these "little valley programs" are established within the entire Bighead River Watershed, the first and probably major step toward reducing the erosion will have been taken. In addition, the participating farmers will not only benefit materially due to increased crop and pasture yields, but will also have the satisfaction of knowing that they have contributed in preserving part of the national heritage for those yet to come.

The Bighead River drainage basin has not yet been completely surveyed with respect to what small watershed programs should be established. It is known, however, that it should start in the area lying to the south and south-west of Meaford. In order to stimulate this program, it is recommended that the

[illegible]

[illegible]

[illegible]

[illegible]

Authority proceed with organizing the first project on the Dunedin Creek Watershed, which is shown in Figure 3. Dunedin Creek, which is named after the predominate soil type in its basin, empties into Tributary A just east of the road between Concessions VI and VII and one-quarter of a mile south of the main channel of the Bighead in St. Vincent Township. This watershed contains approximately 1,278 acres and at the present time is badly eroded in parts, not only on the crop and pasture lands, but also in the stream channels. It is felt that with proper land management this watershed could be rehabilitated and be set up as an example for others in the Region to follow.

The first step, however, would be to gain the co-operation of the people concerned and obtain their agreement to carry out the work recommended by the technical personnel who would plan the area. Any such work would have to be economical to the farmer; so some arrangement would have to be drawn up regarding the financing of these projects. The watershed would then be surveyed by the Conservation Branch in co-operation with the Department of Agriculture and a plan drawn up showing the recommended changes in land use and any soil erosion control structures which would have to be constructed.

A stream gauging station and a sediment-load measuring station would be established at the lower end of the watershed as well as a meteorological instrument enclosure. These would enable the technical staff of the Branch to record the necessary important data on the changing weather conditions, and also keep a record of the amount of run-off from the watershed and the amount of sediment being carried down the stream. These recordings would be continued over a period of years, and as the proper land use measures began to take shape would provide an accurate account of the change in the rate of run-off and the sediment load and the improvement in summer stream flow. Besides giving a distinct account of how conservation pays, these records would also be extremely important in the

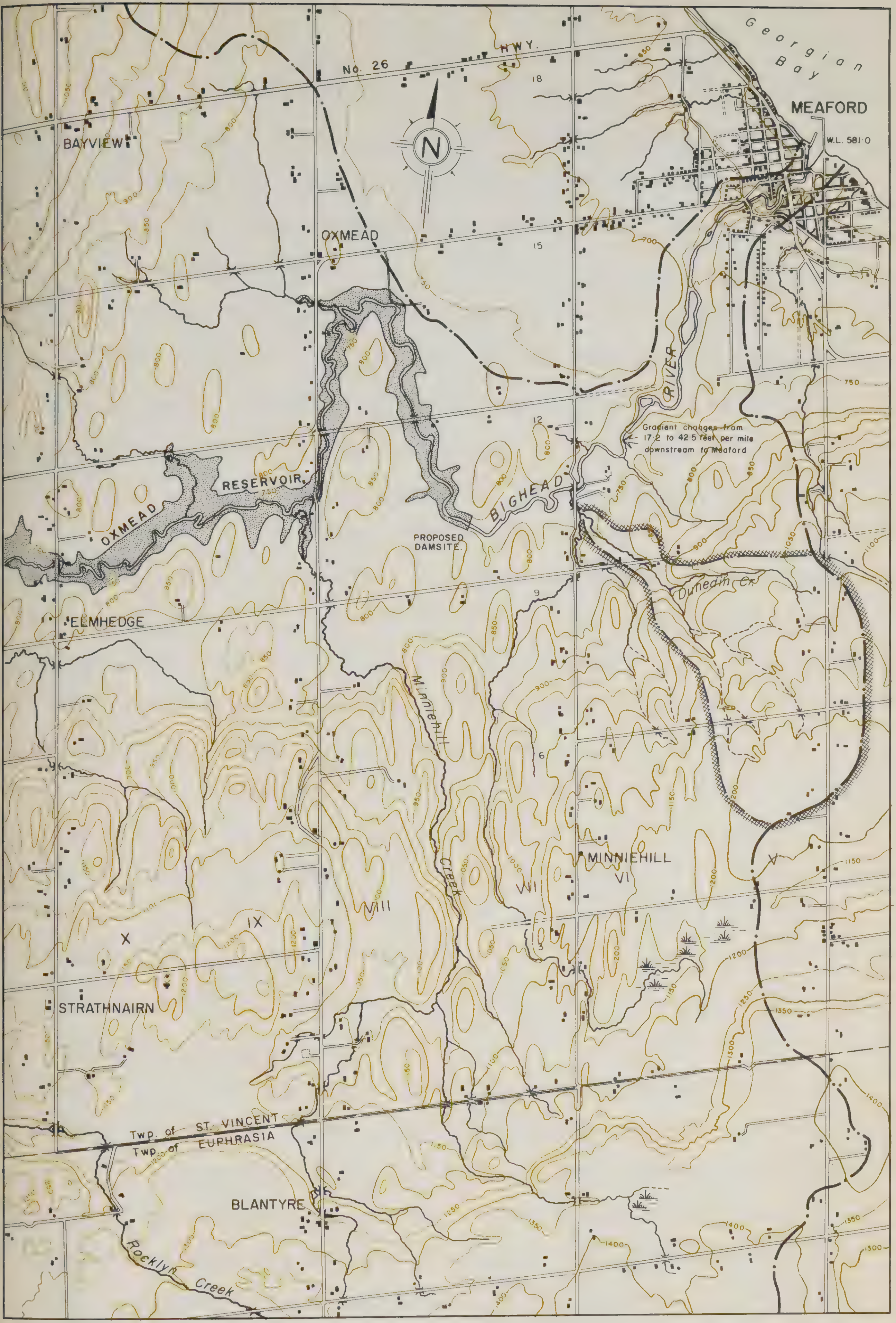

FIG. 3

MEAFORD HARBOUR AND VICINITY

—LEGEND—

BIGHEAD RIVER WATERSHED BOUNDARY

PROPOSED SMALL WATERSHED PROJECT BOUNDARY

CONTOUR INTERVAL 50 FEET. DEVELOPED FROM 1/50,000 TOPOGRAPHIC SHEETS

SCALE—MILES

1 ½ 0 1 2

D. P. & D. CONSERVATION BRANCH Wm. M· 1959

planning of reservoir projects on the Bighead River in the years to come. They would also serve as a guide to other small watershed schemes which, it is hoped, would soon be established in the Beaver and other watersheds of the Region. Should this type of program grasp the imagination of the farmers in the entire Bighead Watershed, it is felt that the first remedial measure to decrease the sedimentation of Meaford harbour would be in progress; namely, by preventing the loss of valuable topsoil through sheet and rill erosion.

(3) Control of Gully and Channel Erosion

This type of erosion is caused chiefly by flood waters scouring the material from the bed and banks of streams, valley trenches and roadside ditches. Such erosion can become quite severe once the protecting vegetative cover on the stream banks or valleys is removed; or the volume of water is increased by excessive run-off resulting from incorrect land use.

The small watershed programs, therefore, will greatly aid in reducing the amount of this type of erosion. Through proper land use, more water will enter the underground storage, and the run-off which does occur will be led off the land slowly instead of in downhill rivulets which ultimately end up as uncontrolled torrents. This is done by contour ploughing, strip-cropping, mulching, etc.

Other means of controlling gully and channel erosion consist of constructing small check dams on the tributaries and by protecting seriously eroded stream banks by riprapping, permeable retards, etc. Many of these projects can be constructed with the materials at hand, such as trees, logs, wire, boulders, underbrush, etc. This program should also be extended to protecting the roadside ditches and the banks of road cuts and fills which are quite a major source of sediment at the present time.

Channel erosion also occurs to quite a serious degree in the main Bighead River. This was referred to in Section 2 (c) of this chapter when reference was made to change

in gradient of the last three miles of the river's course. During flood periods the velocity of the river increases greatly as it changes from a gradient of 5.6 feet per mile to 42.5 feet per mile. This results in scouring of the river channel with much of the suspended and bed load* material eventually being deposited in the harbour or Georgian Bay. One way of remedying this problem is to reduce the velocity of the flow of water by constructing a series of stilling weirs which tend to flatten out the stream gradient. On the Bighead River approximately 16 weirs, eight feet high, would be required to suppress this energy.

The weirs might cause flooding of much of the river valley, especially during high flow periods. Whether or not this would create a serious problem would depend on what the land uses are of the flooded areas at the present time. Of course, the storage capacity behind the weirs would act as a conservation measure; but this would soon be eliminated as the reservoir basins silt up, unless the sedimentation from the agricultural lands is reduced considerably.

Another method of controlling this source of sediment and protecting farm lands, roadways and bridges is by means of streambank protection. There are numerous places in the North Grey Region where work of this type is needed and it is work that is most readily handled by the Conservation Authorities since it requires a minimum of engineering and can usually be carried out locally, employing the materials and labour at hand.

There are several recognized types of bank protection with costs ranging from a few hundred dollars to several thousands of dollars, depending upon the method and materials used and the length of bank protected. Stone rip-rapping is probably the most common. Other types make use of concrete, vegetative covers, brush and wire fencing. Several of the more common types are shown in the accompanying illustration.

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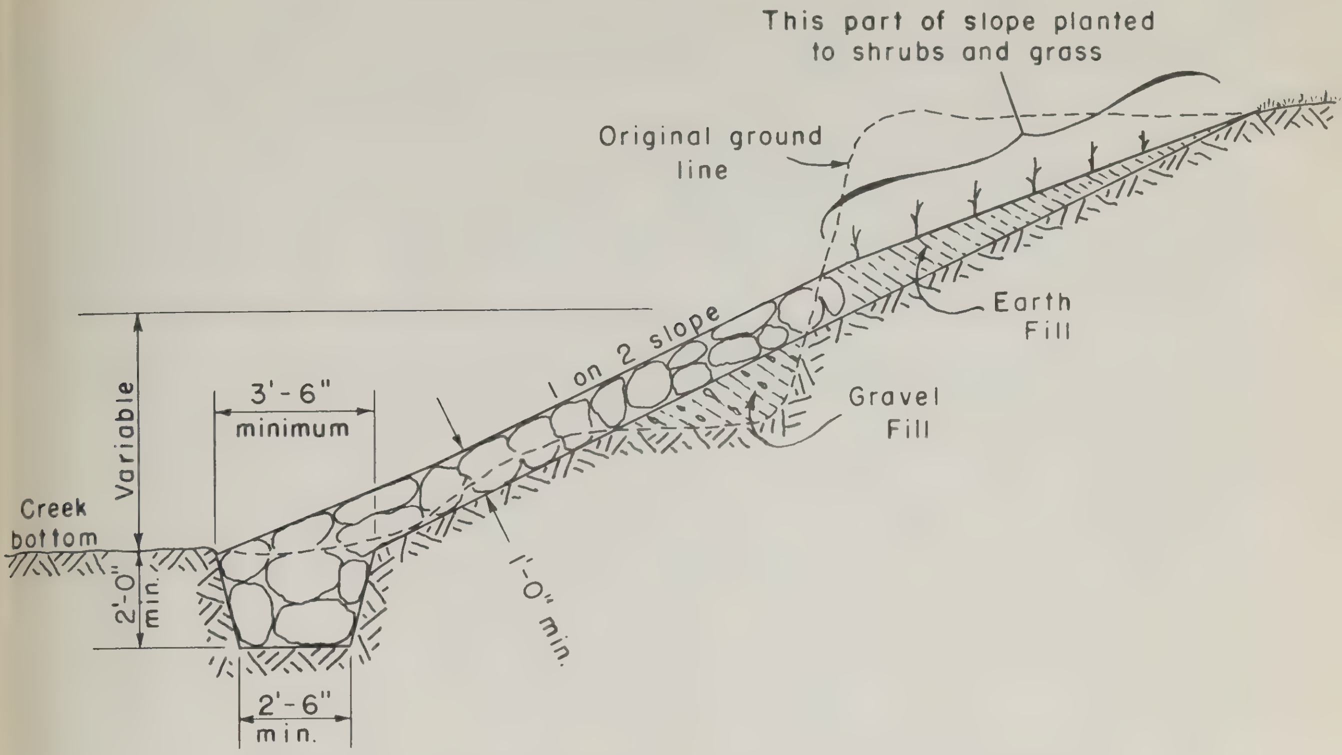
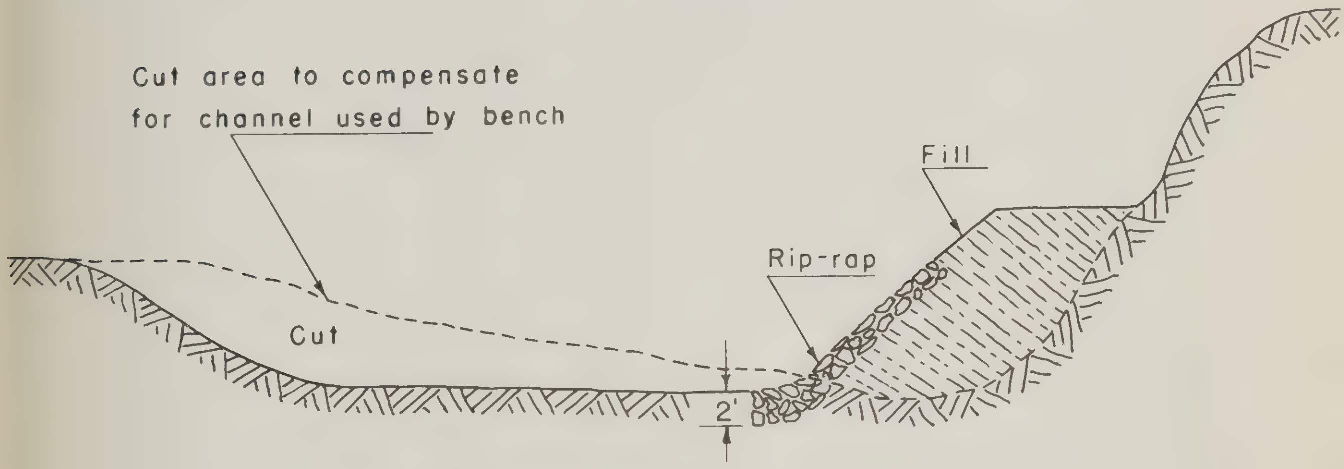
* Bed load - The heavier particles, viz. coarse sands, gravel, cobbles and boulders, which are slid, rolled and bounced along the river bed.

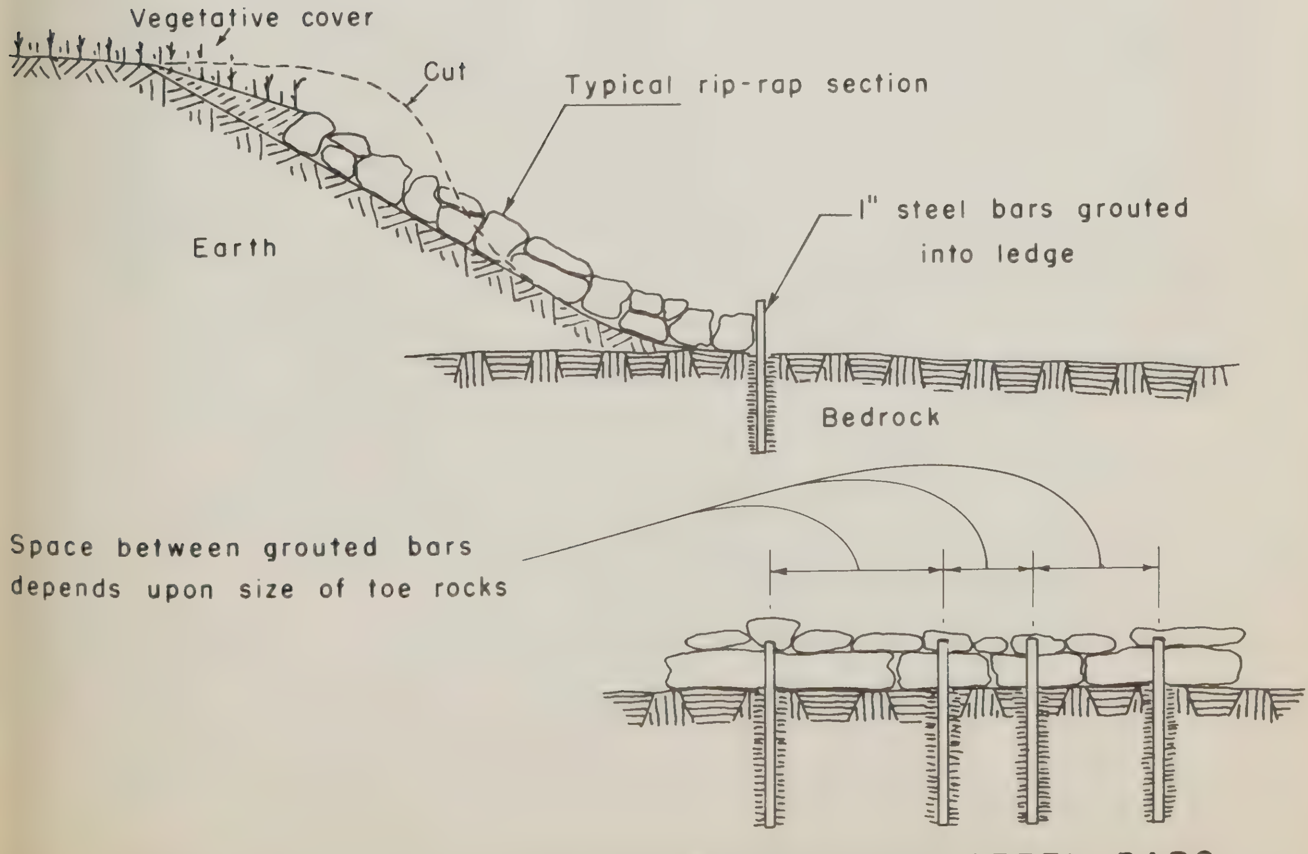
TYPICAL STREAMBANK PROTECTIVE MEASURES



STONE RIP-RAP WITH VEGETATIVE COVER



CUT AND FILL METHOD



STABILIZING TOE ROCK WITH GROUTED STEEL BARS

A third method of reducing channel erosion would be by the construction of the Oxmead Reservoir (Figure 4). The damsite is located just above the point where the stream gradient changes from 5.6 feet per mile to 42.5 feet per mile and the storage capacity behind the dam would absorb a large percentage of the flood flow and the discharge through the spillway could be regulated so as to prevent the scouring of the three miles of the channel downstream. This would also provide flood protection to the downstream farmlands and the town of Meaford. In addition, the resulting permanent lake would act as an excellent water conservation measure and would provide many recreational and wildlife facilities. (Data regarding this dam and reservoir can be found in Table 6, and the reader is referred to Chapter 4, "Available Conservation Storage").

In summary, therefore, it is evident that a considerable amount of sediment is being deposited in the Meaford harbour which has to be periodically removed by dredging, at a high cost to the taxpayer. The source of sediment is located in the farmlands draining into the Bighead River, and in the stream and river channels in the lower regions of the Bighead River Watershed. Besides creating the problem at Meaford, this erosion is also destroying hundreds of acres of valuable farmland. It is believed that this problem could be greatly diminished by proper land use practices and a program of stream channel protection. It is, therefore, recommended that the small watershed program be encouraged and that an investigation be made into the ways and means of controlling the flood flows in the lower 3 miles of the Bighead River and the streambank erosion throughout the Region.

3. Flood Problems

Periodic flooding has been occurring in the North Grey Region for many years and will continue to do so in the years to come. Man, however, has made the soil and water an integral part of himself, and by so doing has had a great

influence on the frequency and magnitude of the floods. By changing the land use and by opening up vast areas for agricultural and urban developments, he has, in general, increased the rate and amount of run-off during periods of high precipitation. This has been done by reducing the amount of protecting vegetative cover; by building many acres of rooftops and highways and miles of drainage ditches and storm sewers. He has also placed himself in a very vulnerable position by building in flood plains and by concentrating urban developments on the banks and at the mouths of rivers.

As this type of development goes on more and more people are hurt by the occurrence of floods, sometimes even by floods of lesser magnitude which formerly would have gone unnoticed. The cost of flooding goes up by tens of thousands of dollars as each major flood occurs, and every once in ten or fifteen years a super-flood occurs which creates untold havoc and misery for those involved. Reference is made to the floods at Meaford and Owen Sound which occurred in 1912, 1926, 1929 and 1954 (see Chapter 2). The occurrence of "Hurricane Hazel" caused unprecedented damage and loss of life throughout Southern Ontario.

The topography of the North Grey Region is quite rugged when compared to other watersheds in Southern Ontario. The lateral slopes and stream gradients are very high and are conducive to fast run-off. Fortunately, quite a large area of the Region is covered by forests, especially on the steeper slopes, and this tends to retard much of the surface flow, resulting in more water entering the ground water storage. Flooding has occurred in the Region, however, and in some cases it has resulted in serious property damages. This should be kept in mind and some thought should be given to the fact that as the urban development increases these problems are going to become more acute unless wise planning is instituted.

Many of the floods have occurred due to ice jams blocking the flow of water as the river breaks up. The river mouth is often blocked either by ice barriers formed from ice floes being brought in from the lake by on-shore winds and

then consolidated by freezing spray or by a heavy ice sheet forming in the quiet backwater and thus preventing ice floes in the river from passing into the lake. The only efficient way of removing ice barriers of this type is by blasting. Experiments have been carried out to melt the ice by coating it with a dark substance in order to increase the solar heat absorption. Thermite* has also been used with limited success. It has been found that where large amounts of cinders are available this can prove to be economical and fairly successful. In the case of a heavy ice sheet, opening a channel through the sheet by means of an ice-breaker or a tug just prior to the river break-up will reduce the hazard, and may prevent ice jams altogether.

The above applies only to flooding caused by ice jams during the break-up period. Floods caused by heavy run-off during a thaw or by heavy rainfall have to be controlled by other means. Proper land use and good conservation practices in general will aid in reducing the rate of run-off. In some cases the stream channel can be enlarged or straightened to increase its capacity, or control reservoirs can be constructed to hold back the flood waters. Bridges and roadways constructed across rivers and streams should be designed to handle the expected peak flows and offer as little obstruction as is economically possible. All these aid in reducing the amount of flooding.

The amount of flood damage and injury to persons can also be reduced by the establishment and use of a flood warning system to alert the downstream areas of impending floods. The establishment of such a system should be encouraged. A further means is by controlling or restricting the development of flood plains as commercial or residential areas. Most of the damage and loss of life is caused because of this practice.

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* Thermite - A chemical compound which produces extremely high temperatures when ignited.

Too many people fail to realize that a harmless-looking stream or drainage ditch can be converted into a raging torrent by a sudden spring thaw or summer thunderstorm.

In conclusion, it is pointed out that there are a number of flood danger points in the Region, and although only the major ones have been investigated at this time, it is recommended that the Authority acknowledge their existence and start taking the necessary steps to bring these under control.

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Meaford Harbour where thousands of cubic yards of silt are deposited annually.

View of the scoured riverbed, Bighead River above Meaford, one of the major sources of sediment.

Sawdust wastes from the mills along the rivers are a source of pollution.

CHAPTER 4

AVAILABLE CONSERVATION STORAGE

1. General

Although it might appear that the North Grey Region has an abundant supply of water, consideration must be given to the potential development of the watershed and to the future demands for water.

To many who have studied the population trends of Grey County, there might appear to be no real cause for alarm since the statistics show that the population of Grey County actually declined by almost 18 per cent during the period from 1901 to 1941. Since 1941, however, the population has increased 6.5%. No doubt it will continue to increase, and there is a possibility that some industrial development may occur in the watershed during the years to come which will increase the population growth rates to the values which have been experienced in other parts of the Province.

Although it is realized that no one can determine what the growth will be during the next 10 or 25 years, it can be said that it would be limited by the supply of good water. This water will be required for industrial processing, domestic areas, and to treat sewage. Added to this is the need for more reliable stream flows since no matter how efficient a sewage treatment plant might be, the effluent has to be diluted by a considerable flow of good water to make it usable for other purposes.

In the future, water might be required for other uses such as irrigation and possibly power which will result in still further demands on the available supplies. Most water used for irrigation is lost through evaporation and transpiration and little, if any, is returned to the rivers. This use will become more important as the demand for food products, such as apples from the Meaford and Thornbury areas, increases.

The North Grey Region is blessed with a substantial annual precipitation of approximately 34 ins. (This is made up of 23 ins. of rainfall and 109 ins. of snow). This should be sufficient for all future development providing its use is properly planned. There are instances in Southern Ontario where urban development has increased at such a rate that the demand could not be met and has resulted in the rationing of water and the expenditure of large amounts of capital to develop new sources. The North Grey Region may not be anticipating such an upsurge in development at the present time which gives it the distinct advantage of having time to plan and conserve for the future. It is the responsibility of the Advisory Board on water control to investigate and report on existing problems arising from the use of water, such as its conservation, prevention of pollution and control of flood crests. A further duty, which is probably the most important, would be to commence a long term program of planning designed to meet the future demands for water and thereby eliminate costly shortages and problems which might otherwise arise.

The means of conserving a larger proportion of the annual run-off can be divided into two broad categories, namely subterranean storage and surface storage. The methods through which this can be brought about require the combined knowledge of land use and forestry specialists, hydrologists, meteorologists and engineers. An overall plan leading to the ultimate goal of conserving more water can be drawn up through the co-operation of these people, but the end result lies directly with the people living on the watershed, especially the farmers. This is particularly true in the case of conserving underground water reserves, which are the major source of water for the entire watershed. A large percentage of the farmers obtain their domestic water supplies from wells. This also applies to many villages and towns. The reliability of these wells depends on the amount of water entering the soil

during periods of precipitation. Contour ploughing, strip cropping, crop rotations, mulching, reforestation and proper care of woodlots all combine to slow down the rate of run-off. With correct field husbandry practices, the infiltration rate can also be increased, thereby increasing the amount of water recharging the aquifer. This will assure reliable wells and streams as well as reduce the peak flood flows and soil erosion.

Not only do the ground water reserves benefit from these correct land use practices, but so does the productivity of the land. This is due to the development of a deep rooting zone which is easily penetrated by air, water and roots. It is also able to hold sufficient water for plant growth while allowing the excess water to pass through it, all of which result in maximum plant growth. Some lands, however, might be too low-lying or have soil types which require that they be artificially drained in order to be used to their best advantage. This should only be done where it is known that the soil will be able to produce an economic crop and where it will not have a serious effect on the flow of surface streams.

The headwaters of many streams are located in wooded or swampy areas which, if properly managed, will provide a steady stream flow all year round. There are cases where woodlands have been cleared, and swamps drained for crop land, resulting in streams drying up during the dry periods. In many cases, these lands have proven to be uneconomic as crop producers and the streams could be restored to their previous state by reforestation and other conservation practices. It is recommended that the Authority investigate the intermittent flowing streams in the watershed with the view of restoring their headwaters. It is also recommended that the farmers be encouraged to seek the advice of the Authority regarding the preservation of the headwaters and the advisability of any municipal drainage schemes.

The other method of conserving water is by constructing dams and thereby creating large surface reservoirs. These have the advantages of being available for recreation purposes as well as providing a habitat for wildlife, although there is quite a loss of water through evaporation. Many dams have multi-uses such as flood control, water storage, recreation and providing supplemental stream flow. Some of these uses have been discussed in more detail in other chapters of this report where existing problems have been examined and recommendations made as to how these may be solved.

Topographic maps of the North Grey watershed were examined for possible storage basins and a total of fourteen damsites were selected. Seven of these are located on the Sydenham River while the remainder are located on the Bighead River. Two sites were surveyed in detail, one of which, the Oxmead site, is shown in Figure 4. This site was selected as part of the solution to the sedimentation problem in the Meaford Harbour (see Chapter 4). The dam and reservoir data of all the sites appear in Table 7.

It is impossible to determine at the present time just exactly what the development will be in the future and where the demands and shortages of water will occur. However, good reservoir sites must be regarded as vital assets to any area and it is felt that the Authority should take steps now to purchase one or more of the reservoir sites recommended below while land values are still low. This is important, since should any industrial or commercial developments take place in the vicinity of a site, its value would be greatly increased. In the meantime, they could be developed as Conservation Areas which would be open to the public.

Following are the descriptions and merits of the thirteen reservoir sites which were examined. The location of these sites can be found on the map of the watershed shown in Figure 1. Estimated costs for the three more

important reservoirs, one of which may be constructed in the foreseeable future, only are given since it is felt that the present day costs for the remaining projects would be of little value by the time construction would be considered.

2. Reservoir Sites

(1) Inglis

The Inglis site is located in Lot 9, Concession I, Derby Township at a point about 500 yards above Inglis Falls and 4 miles upstream from the mouth of the river in Owen Sound. The drainage area above this point is 68.9 square miles which would supply adequate run-off to fill the reservoir.

The topography of the damsite is suitable for a 15-foot dam, which would provide 2,200 acre-feet of storage with a maximum depth of water of 10 feet at the dam. When full the reservoir would flood 850 acres of land and, while the area is largely scrub bush and swampy, some cultivated lands, 0.7 miles of wood and one road bridge would also be flooded. Also in view of the wide area flooded a large part of the reservoir would be quite shallow and unsuitable for long-term storage owing to the weed growth which would develop.

However, a smaller pond could be maintained for recreational purposes and the remaining storage capacity reserved for flood control. This would fit well into the proposed Inglis Falls park area and being located close to Owen Sound the flood storage capacity could be used effectively. It is recommended that sufficient land be purchased to reserve this area for a small recreational lake and flood control storage. Use of the shallow areas for flood control storage would not seriously affect the land or vegetative cover since the reservoir would be lowered as soon as the flood threat was over.

The cost of this project would be approximately $300,000.

(2) Keward

This damsite is located on the Sydenham River in Lot 1, Concession IIW and IIIW of Sullivan Township, at a point 2½ miles north-west of Chatsworth.

A long dam, with a maximum height of approximately 29 feet, would create a reservoir with a surface area of almost 2,000 acres and a storage capacity of approximately 20,300 acre feet of water. The maximum water level would reach the 900-foot (G.S.C.) contour level. It might be found, however, that a more economical dam and reservoir could be obtained at a lower elevation, probably the 897-foot level. This would mean sacrificing some of the storage capacity for a reduced cost and less land being flooded. A detailed survey of the site would determine the most economical water level.

The site is largely covered with trees and swamp although there are a few hundred acres of farmland involved. The reservoir at maximum level would flood almost 4 miles of roads and 5 bridges and would require raising and re-routing some roads.

The total drainage area covers 23.19 square miles which means that approximately 16.5 inches of run-off over the entire area would be required to fill the reservoir to the 20,300 acre feet capacity. This could fill up over a period of time, but it is evident that the full capacity could not be fully exploited each year. This storage, however, would provide good flood protection to Owen Sound in the event of excessive run-off. The reservoir would also provide about 65 c.f.s. of supplemental flow for a period of three months and an adequate water supply for the area. In addition many recreational facilities could be made available.

The full potential of this reservoir site might be utilized by constructing a small dam on the Spey River and diverting the flow into the reservoir area. This would add 17 square miles to the drainage area controlled by the dam with

added water supply for filling purposes and greater flood protection for the city of Owen Sound. With the diversion, the run-off from 40 square miles or nearly 60 per cent of the total drainage area of the Sydenham River above the city would be controlled.

The project could be developed in stages over a period of years and it is recommended that the Authority proceed with the purchase of the necessary land.

The estimated cost of this project excluding land would be:

Keward Dam and Reservoir	$400,000
Spey River Dam and Diversion	$100,000
Total cost	$500,000

(3) Sullivan

This site is located on the Sydenham River in Lot L, Concession IV of Sullivan Township.

A 30-foot dam would raise a reservoir to a maximum elevation of 950 feet (G.S.C.) and would flood approximately 173 acres. The basin has a storage capacity of 1,800 acre feet and has a total run-off area of 11.9 square miles.

Almost 2 miles of road, 2 bridges and 3 farmsteads would be flooded as well as quite a large acreage of crop and pasture land. Because of this, the site is not considered to be very suitable at the present time.

(4) Williams Lake

Williams Lake is the headwater of the Sydenham River and covers an area of 134 acres. In 1951, a survey was made by the Kilborn Engineering Co. Ltd., to determine whether or not more spring run-off water could be stored in the lake for later release during the dry summer months in order to supplement the stream flow.

It was found that by constructing a dam downstream from the lake, it would be possible to store approximately 2,300 acre feet of water which could be used as supplemental flow.

The proposed dam would be located in Lots 37 to 39, Concession III Holland Township and on the road allowance between Concessions III and II. The elevation of the top of the dam would be 1,073 feet (G.S.C.) and the sill of the spillway would be at 1,057 feet. The maximum water level elevation would be 1,068 feet, which is 7.5 feet above the 1060.5 lake level mark which occurred on December 15, 1950.

This means that the winter and spring run-off would raise the lake to the 1,068 elevation. During the dry months the water would be released until the level dropped to the 1,057 elevation, a drop of 11 feet.

One question arises, however, and that is whether or not there would be sufficient spring run-off to fill the lake. It has been estimated that 2,300 acre feet would be available for supplemental stream flow during the summer. This means that 2,300 acre feet would have to be replenished each spring. The total run-off area amounts to only 2.3 square miles, that is, 1,472 acres. The amount of run-off required, therefore, equals

$$\frac{2,300}{1,472} \times 12 = 18.72 \text{ inches.}$$

From the records of the Meteorological Service, it was found that the mean total annual precipitation for the region is 34 inches. The mean total precipitation for the months of October through to March is only 24.64 inches. It is during these months that a total of 2,300 acre feet, or 18.72 inches of run-off is required. From the above, it can be seen that this volume is 55 per cent of the total annual precipitation, and 76 per cent of the total precipitation for the months mentioned above.

The average run-off rate is 25 to 30 per cent of the total annual precipitation and the above high run-off rates, especially for the months from October through March are only likely to occur under extreme conditions. This means that although the storage capacity is available, the run-off in any year would seldom be sufficient to fill the reservoir and it is

felt that it should not be approved as a source of supplemental stream flow.

It might also be added that, since the survey was made in 1951, a number of cottages have been built around the lake and its waters are being used more and more for recreational purposes. There is no doubt that any project designed to cause the lake level to fluctuate 11 feet would not be acceptable to those who have invested in this area.

(5) Rockford

The Rockford reservoir site is located on the North Spey River, which is a tributary of the Sydenham River. The damsite is located in Lot 7, Concession XI of Sydenham Township.

A total of 12.5 square miles of run-off area would drain into the reservoir which would flood an area of approximarely 403 acres. A 30-foot dam would raise the water level to the 950-foot elevation (G.S.C.) and would store approximately 4,200 acre feet of water.

The area which would be flooded is at present time almost entirely covered by trees and swamp. Very little crop land would be inundated although about a quarter of a mile of roadway would probably have to be raised. The maximum water depth would be about 25 feet but, in general, the reservoir would be quite shallow.

This is a comparatively good reservoir site, but in view of the limited drainage area the flood control benefit would be small.

(6) Chatsworth

This site is also located on a tributary of the Sydenham River, namely, the Spey River. The damsite is located in Lot 7, Concession III of Holland Township.

A 25-foot dam would raise the water to a maximum elevation of 1,025 feet (G.S.C.) and would result in approximately 346 acres being flooded. Approximately 5.6 square miles would drain into the reservoir and it is estimated that

almost 2,900 acre feet of water could be stored. Approximately half a mile of roadway would have to be raised. Almost the entire flooded area consists of either woods or swamp so no agricultural land would be flooded. It is, therefore, felt that the Authority should preserve this site in case it is needed in the future.

(7) Hoath Head

This is the final site on the Sydenham River system and is located in the headwaters of the North Spey tributary. The damsite is located in Lot 5, Concession VIII of Sydenham Township.

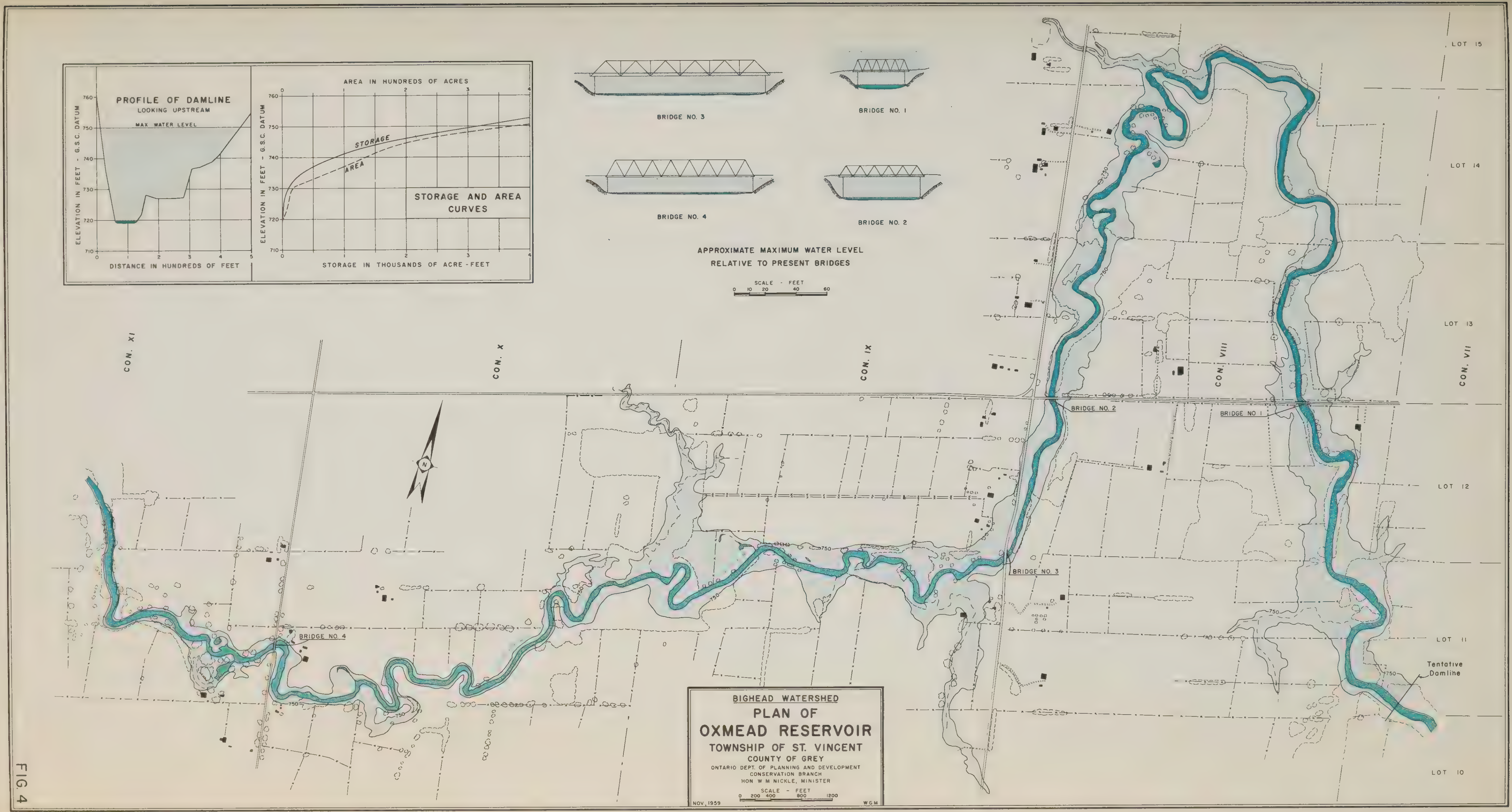
An 18-foot dam would flood approximately 326 acres to a maximum depth of 13 feet. A total of 1,768 acre feet of water would be stored when the water level reached the maximum elevation of 1,025 feet (G.S.C.). Since the damsite is located in the headwaters of the river the run-off area is rather small being only 4.5 square miles. The inundated area is at present mostly swamp and bush which no doubt helps in maintaining the stream flow during the summer months. Although no urgent need for this site exists at the present time, it is felt that this headwater should be preserved. The Authority might, therefore, consider its purchase for this reason.

(8) Oxmead

This site is located on the Bighead River at a point approximately 4½ miles upstream from the river's mouth at Meaford. The damline is located in Lots 10 and 11, Concession VII of St. Vincent Township.

This reservoir would be able to store 3,200 acre feet of water should a dam be built to raise the water to a maximum level of 750 feet (G.S.C.). This would require the construction of a dam 36 feet high at an estimated cost of $700,000.

Approximately 372 acres of land would be flooded, most of which is river bottom land. Approximately three-quarters-of-a-mile of roads would be flooded. There are also


PROFILE OF DAMLINE
LOOKING UPSTREAM
MAX. WATER LEVEL
ELEVATION IN FEET - G.S.C. DATUM
DISTANCE IN HUNDREDS OF FEET
AREA IN HUNDREDS OF ACRES
STORAGE
AREA
STORAGE AND AREA CURVES
STORAGE IN THOUSANDS OF ACRE-FEET
BRIDGE NO. 3
BRIDGE NO. 1
BRIDGE NO. 4
BRIDGE NO. 2
APPROXIMATE MAXIMUM WATER LEVEL
RELATIVE TO PRESENT BRIDGES
SCALE - FEET
LOT 15
LOT 14
LOT 13
LOT 12
LOT 11
LOT 10
CON. XI
CON. X
CON. IX
CON. VIII
CON. VII
BRIDGE NO. 2
BRIDGE NO. 1
BRIDGE NO. 3
BRIDGE NO. 4
Tentative Damline
750
BIGHEAD WATERSHED
PLAN OF
OXMEAD RESERVOIR
TOWNSHIP OF ST. VINCENT
COUNTY OF GREY
ONTARIO DEPT. OF PLANNING AND DEVELOPMENT
CONSERVATION BRANCH
HON. W. M. NICKLE, MINISTER
SCALE - FEET
NOV. 1959
W.G.M.
FIG. 4

four bridges crossing the river in the flood area, of which three would have to be raised and the other abandoned.

This reservoir would have multi-purpose uses. A permanent lake, 135 acres in area, would be established at the 740-foot contour level and could be used for recreation purposes. The remaining amount of storage (2,350 acre feet) would provide adequate flood control for Meaford and would also control the flow of water in the 4½ miles of river below the dam. This would prevent the scouring of the river channel and thereby reduce the amount of sediment reaching the Meaford Harbour (See Chapter 3, Section 2). By controlling the flow at the dam, there would always be a sizeable stream flow below the dam, especially during the dry summer months. This would ensure that the proposed Meaford Community Pond would always have a fresh supply of water. In addition, there would be sufficient water stored in the reservoir to provide Meaford and the surrounding area with an adequate supply should a rapid development of the area occur.

It is, therefore, recommended that the Authority proceed with the purchase of this site as soon as possible. A detailed plan of this reservoir can be seen in Fig. 4.

(9) Elmhedge

This site is also located on the Bighead River at a point just 1 mile west of the hamlet of Elmhedge. The damsite is located in Lot 9 of Concession 12 of St. Vincent Township.

It is estimated that approximately 5,520 acre feet of water could be stored in this basin by constructing a dam 20 feet high with a maximum depth of water of 15 feet. Since the reservoir would flood 883 acres, the average depth of the lake would only be about 6 feet and consequently most of the reservoir would be quite shallow and swampy in places. A number of farms are located within the flooded area and approximately 2½ miles of roads would be flooded.

Some consideration should be given to this site since the construction of the reservoir would give a fairly large amount of storage at a reasonably low cost. In the event of the Oxmead Reservoir being built, however, the need for this site would be eliminated.

(10) Bognor

This site's location is southwest of the village of Bognor and the damline is located in Lot 3, Concession IX of Sydenham Township.

The maximum water level of the reservoir would reach the 825-foot (G.S.C.) contour with a total flooded area of 345 acres. It is estimated that approximately 3,890 acre feet of water could be stored with a maximum depth of 27 feet at the dam, and an average depth of just over 11 feet. Drainage above this site is 26.5 square miles.

The land flooded consists mainly of crop and pasture land with some woodlots. About a mile-and-a-half of roads and two bridges would also be flooded. The site is a fairly good one, however, and consideration should be given to its purchase.

(11) Massie

This site is located just over a mile north-east of the village of Arnott on Highway No. 10 in Lot 5, Concession IV E of Holland Township. Drainage area above this site is 8.4 square miles.

A 20-foot dam would raise a reservoir to the 1,025 foot elevation and would flood 345 acres. A total of 2,160 acre feet of water would be stored with a maximum depth of approximately 15 feet. The reservoir site is entirely wooded and much clearing would have to be done. Only about half a mile of road and 2 bridges would be affected and it would appear that these could be easily raised. This site should be given secondary consideration.

(12) Walters Falls

This site lies on Walters Creek just south of the hamlet of Walters Falls. The damline lies in Lot 3, Concession XII of Holland Township.

A 25-foot dam would be required to raise the water to the 1,200-foot contour. With 5 foot of freeboard, the depth of water at the dam would be approximately 20 feet. The storage capacity is in the neighbourhood of 3,360 acre feet which makes it the third largest site on the Bighead Watershed. The reservoir would flood 403 acres, most of which is covered by woods and swamps. About $\frac{3}{4}$ of a mile of road and 3 bridges would have to be raised. A run-off area of 16 square miles drains into the basin.

This is considered to be a good site and should be retained in case it is needed in the future.

(13) Minniehill

This is a small reservoir site located in Lot 2, Concession VI of St. Vincent Township. Since it has a run-off area of only 2.85 square miles and a storage capacity of only 1,760 acre feet, it is not considered to be a good site. However, it is located in the headwaters of the Bighead River and as such it should be allowed to remain wet and swampy and protected by vegetation.

TABLE 6 - DAM AND RESERVOIR DATA - NORTH GREY REGION

Reservoir	Drainage Area Sq. Mi.	Reservoir		Dam					
		Surface Area Acres	Capacity Ac.Ft.	Elev. - Feet G.S.C.			Water Depth Feet	Height Feet	Length Feet
				Max. W.L.	Bed of Stream	Crest			
Sydenham River									
Inglis	68.9	853	2,200	880	870	885	10	15	450
Keward	40.0	2,035	20,300	900	876	905	24	29	5,300
Sullivan	11.9	173	1,800	950	925	955	25	30	500
*Williams Lake	2.3	340	2,300	1,068	1,057	1,073	11	15	2,250
Rockford	12.5	403	4,200	950	925	955	25	30	350
Chatsworth	5.6	350	2,900	1,025	1,005	1,030	20	25	500
Hoath Head	4.5	326	1,768	1,025	1,012	1,030	13	18	700
Bighead River									
Oxmead	123.2	372	3,200	750	719	755	31	36	450
Elmhedge	88.0	883	5,520	775	760	780	15	20	600
Bognor	26.5	345	3,890	825	798	830	27	32	900
Massie	8.4	345	2,160	1,025	1,010	1,030	15	20	250
Walters Falls	15.6	403	3,360	1,200	1,180	1,205	20	25	250
Minniehill	2.9	192	1,760	1,150	1,128	1,155	22	27	400

* Survey by Kilborn Engineering Co., 1950.

CHAPTER 5

COMMUNITY PONDS

1. General

The benefits being derived from community ponds are becoming increasingly appreciated throughout the Province, especially in heavily populated areas. This can be seen by the large numbers of people who each summer flock to the thousands of bodies of water in Southern Ontario, however small they might be. Flooded gravel pits and quarries, old mill ponds, newly constructed ponds and even plain stretches of river are attracting an increasing number of people each year. Since this has resulted in serious overcrowding in some areas, the Conservation Authorities are strongly advised to prepare a program for community pond development.

The advantages of such ponds are numerous. Besides providing a place for recreation, their proximity to the community enables their waters to be used for fire fighting purposes. A case in point is the hamlet of Bognor which is located within the North Grey Region Authority. Recently the waters of the nearby mill-pond were used to douse a large fire which might otherwise have destoyed the community. (A brief description of this pond appears further on in this chapter). In the past, community ponds have also aided in controlling bush fires which could quite possibly have destroyed valuable woodlots.

Another advantage of a community pond is its water conservation features. All too often, especially in new industrial and residential communities an excessive amount of the annual precipitation is allowed to flow down the streams to the lakes. Any structure, therefore, which tends to conserve a portion of the precipitation, aids in maintaining the ground water table level which insures a more reliable stream flow.

A further advantage of a community pond is its ability to provide a habitat for various forms of wildlife.

It can be stocked with fish and if conditions are favourable, wildfowl, muskrats and other forms of life can be encouraged to use its waters. Besides these material benefits, the pond, if properly managed, can have an aesthetic value which is of great importance to the well-being of the community.

The area covered by the North Grey Region Conservation Authority offers many sites which are very well suited for development as community ponds. However, due to the many existing ponds and nearby beaches on the Georgian Bay and Lake Huron shorelines, as well as beautiful streams and scenic drives, the problem of providing facilities for community recreation is not as acute as it is in other Authorities in the Province. The influx of tourists and week-end visitors is on the increase however, and in the years to come, the present facilities will become overcrowded unless they are expanded. It is, therefore, recommended that the Authority proceed with a long-term plan for the acquisition of suitable community pond sites. At the same time it should encourage and also offer technical assistance to the smaller communities in the development of their own pondsites.

Some villages on the watershed have already made a start in the right direction by developing nearby mill-ponds. These are invariably located on fairly reliable streams since originally they were built to supply water to power the various types of mills. Of those still operating, many are now being driven by electric power and quite often the ponds have been allowed to fall into disuse. The dams, however, are generally in fairly good condition and the pond could be restored with little capital expenditure.

Abandoned gravel pits and quarries which have filled with water are also popular as recreation areas. There are quite a number of these sites which might have remained an eyesore had not the local people decided to develop them. These ponds are usually filled with clean fresh water from springs

which makes them suitable for swimming although, at times, the temperature might be too cold for some of the less hardy swimmers. Where some type of control structure, such as stop-logs, regulates the water level it should be designed so that the water will be discharged from the bottom of the pond thereby leaving the warm surface water in the pond. This also applies to mill dams and temporary dams.

Not all communities are fortunate enough to have an old mill-pond or gravel pit nearby. Quite often, however, they are located near a stream which could possibly be dammed. This is best done by erecting a temporary type dam which consists of a concrete sill across the stream bed with concrete abutments set into the banks. Wooden flashboards, supported by steel posts placed in sockets in the sill are put in after the spring freshets have passed. A good-sized pond can be created with this type of dam if the site is carefully chosen.

Several factors should be kept in mind when considering the selection of any community pond site. Firstly, easy accessibility and proximity to the community is essential. Secondly, the facilities should be able to adequately accommodate the expected size of crowd. The water feeding the pond should be free from pollution, warm enough for comfortable swimming and should have a reliable flow. The surrounding land should provide adequate picnic and parking space so as to prevent the blockage of nearby roadways. Provision should be made for sanitation and garbage collection facilities while the construction of change rooms, and possibly a refreshment booth, is necessary at larger sites. If a dam is to be constructed, the site should be chosen to give as much pond surface area as possible and a depth of water of at least five feet. Finally, the area should be free of various types of hazards such as old wells, submerged tree stumps and dangerous ruins, which might endanger the lives of those using the area for swimming, boating, fishing, skating or any other form of recreation.

In order to assist the Authority in locating suitable community pond sites, and especially former mill-ponds, two lists of possible sites appear below. The first list consists of fourteen sites which were investigated. These are fairly well distributed over the Authority as can be seen from the Community Pond map which appears in Figure 5. The second list gives the location of mill-ponds which have been known to exist in the watershed during the past 100 years or more. (The source of this information is shown at the end of the list. It is quite possible that there are other mill-ponds in the watershed which are not recorded in the report). Unfortunately, it was not possible to investigate all of these sites. It is hoped, however, that a more complete survey will eventually be made and that the Authority will encourage the development of any sites which prove to be suitable for community ponds.

2. Possible Community Pond Sites

E = Existing pond
P = Possible pond

Artemesia Township

E-1 Flesherton North Lot 147 Concession 1E

This old mill dam, situated on the northern limits of Flesherton is in fair condition and holds back a pond covering approximately two acres. At the time of inspection, the water was dirty and contained large quantities of algae. This condition was experienced in a number of areas during the summer of 1958, however, and could be due to the unfavourable weather conditions. The area below the dam was kept very wet by the presence of a number of good springs. There is plenty of parking space and the area is quite attractive.

E-2 Flesherton South Lot 149 Concession 1W

This pond provides water power for the Co-op mill in the village of Flesherton. There is a good sized body of water which is already being used for recreational purposes. A diving board and small shelter have been erected and a parking

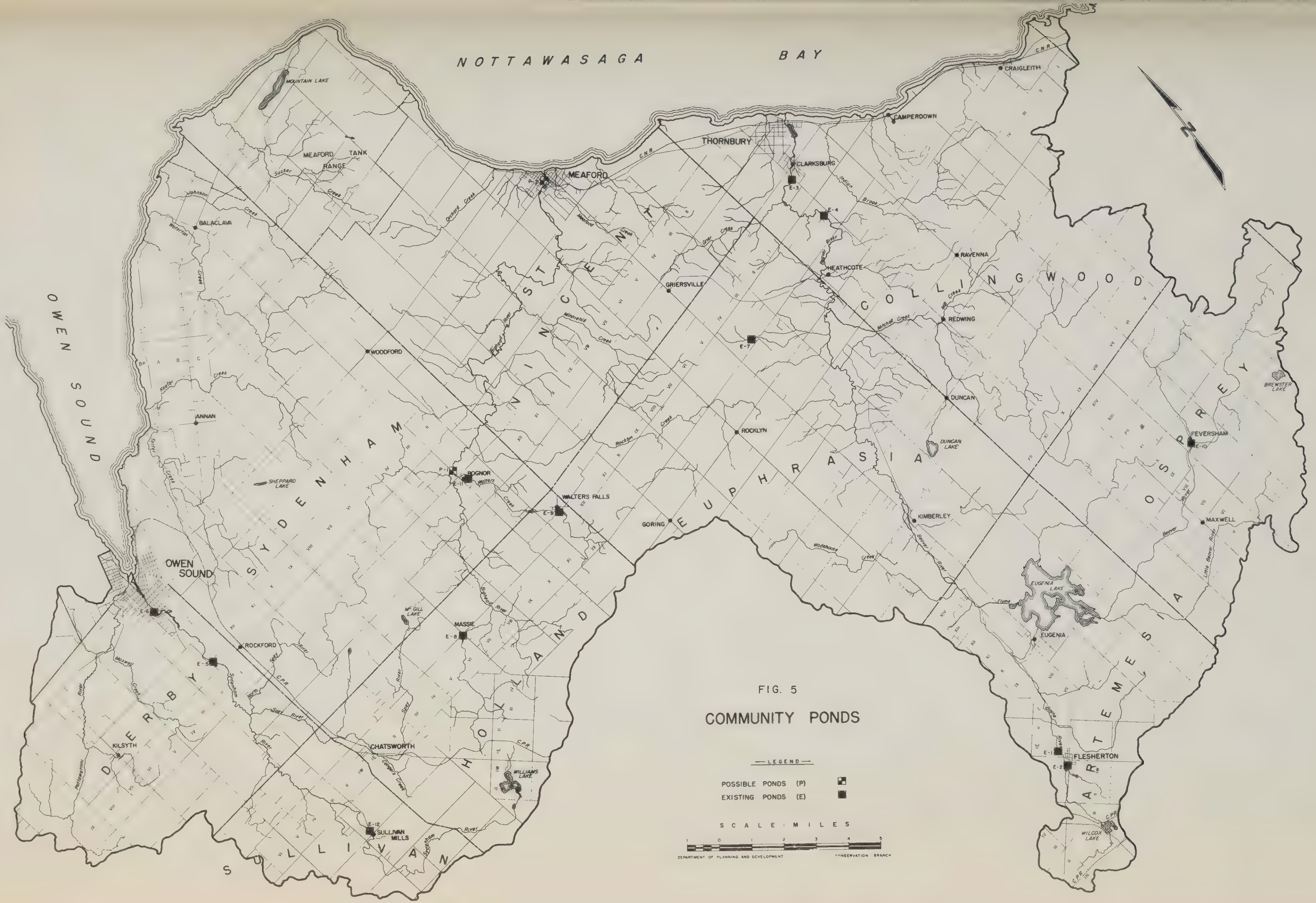


FIG. 5

COMMUNITY PONDS

lot has been levelled and gravelled. The site, however, has scope for further development and its development should be encouraged by the Authority.

Collingwood Township

E-3 Clarksburg South Lot 30, Concession XI

There is a long concrete dam at this site which was formerly used to empound water to drive a small hydro electric power station. The site is now abandoned.

The pond is 300-400 feet long and has silted up a fair amount and in places is overgrown with weeds. This condition could be improved by placing flashboards across the spillway to raise the water level from 6 to 12 inches. There is an excellent stand of timber through which nature trails could be cut and picnic areas cleared. This site has good access to Highway 26 which is only 2 miles to the north-east and should be one of the first considered for development.

E-4 Heathcote East Lot 26, Concession XI

This is a good flat site which has many possibilities although the concrete dam requires much repair work done to it. There is a good pond and sufficient available land for development.

Derby Township

E-5 Inglis Falls Lot 11 Concession I

This is a very attractive site which should be among one of the first given consideration. The pond covers approximately 5 acres and the dam wall is approximately 12 feet high. There are beautiful scenic views since the pond is located just upstream from the Inglis Falls.

The area is already being used as a picnic area and is presently owned by the Owen Sound Public Utilities Commission.

E-6 City of Owen Sound

This old mill-pond lies within the city limits of Owen Sound and is the centre of a residential area. It is used

An attractive Community Centre could readily be developed around the millpond at Massie,

Sullivan Mills would also make an ideal community pond.

Small removable type dams such as this one at the Boyd Conservation Area on the Humber River may be constructed to provide a suitable pool for recreation.

by local residents for swimming and boating and was partially developed by the City which owned the dam and some of the surrounding land.

The repair of this dam and general development of the adjacent land has been undertaken as a scheme of the Authority and serves to illustrate how such sites can be utilized. It is felt that this area is a great asset to the nearby residents even though space is limited.

Euphrasia Township

E-7 Heathcote West Lot 25, Concession IV

This is an abandoned mill site on the west ridge of the Beaver Valley. The concrete dam has been recently reinforced by concrete buttresses and could hold back a small-sized pond. The dam lies on the north-west side of the road while the mill is located across the road just above a waterfall approximately 60 feet high. After plunging over the falls the stream flows through a deep gorge and on into the Beaver River.

This site has a fair potential and should be given consideration after some of the more attractive sites on the watershed.

Holland Township

E-8 Massie Lot 4, Concession VI

This site is located in the attractive little hamlet of Massie just 5 miles east of Chatsworth and No. 6 and 10 Highways. The dam, which is in fairly good condition, is 120 feet long and holds back a pond of clear water covering an area of approximately 2 acres. There is some parking space and enough area for picnicking etc.

E-9 Walters Falls Lot 2, Concession XII

A beautiful 6-acre pond lies 10 miles east of Chatsworth in the hamlet of Walters Falls. There is a good dam and plenty of land available for development. Nearby there is a scenic waterfall and a deep gorge through which nature trails could be cut.

This site has a lot to offer as a recreation area and should be given serious consideration by the Authority.

Osprey Township

E-10 Feversham Lot 17, Concession IX

A clear attractive mill pond approximately 300 feet long and 40 feet wide is located on the east edge of Feversham. The area is already being developed to a limited extent by local residents. The pond is located within the fair grounds which provides plenty of parking facilities and playground space. Its suitability as a campsite has already been exploited by a number of campers and it is felt that this project should be encouraged to develop even further.

Sydenham Township

P-1 Bognor North Lot 7, Concession II

A beautifully wooded piece of land lies along the river banks just north of the village of Bognor. This site could be developed as a very attractive picnic area with nature trails. Swimming, however, might be limited to a few dug-out "swimming-holes" in the stream bed.

E-11 Bognor Lot 6, Concession II

An old mill dam in need of repair is located on the east side of Bognor. The earth dam was overtopped during Hurricane Hazel and has been eroded in a few places. The burnt ruins of the old mill detract from the surroundings. However these could be removed without too much difficulty. The pond is fairly large and there is ample land available for development.

St. Vincent Township

P-2 Town of Meaford

The construction of a temporary type dam located about 1 mile upstream from the mouth of the Bighead River at Meaford would create a fairly large pond which would attract many visitors. The Town of Meaford owns 6 acres of very well wooded land on the banks of the river at this point. The Authority has been approached by the Town Council regarding the

[illegible]

[illegible]

[illegible]

development of this site and a survey of the river in this vicinity has been made. (See Figure 6).

Sullivan Township

E-11 Sullivan Mills   Lot H, Concession IIW

A good dam holds back a 4-acre pond which supplies power to a grain mill which is still operating. The water is very clean and suitable for fish.

The surrounding area is very attractive and spacious with both open and wooded areas. This site is only 2½ miles west of Highway No. 6 and should be given consideration.

The following is a table of data for existing dams on the rivers of the North Grey Region taken from the 1949 Dam Census, Survey Division, Department of Lands and Forests.

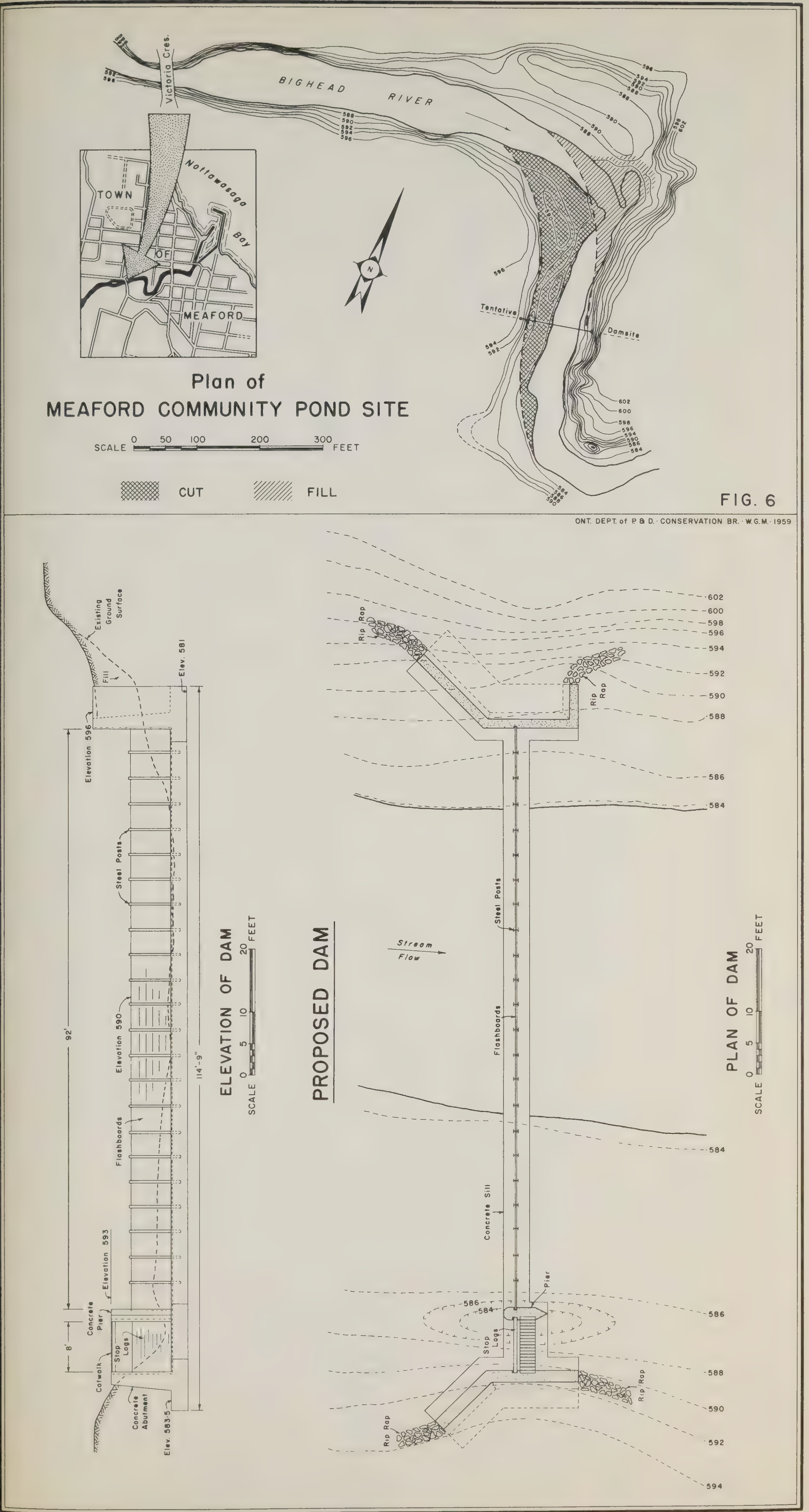

Plan of
MEAFORD COMMUNITY POND SITE
SCALE 0 50 100 200 300 FEET
CUT
FILL
BIGHEAD RIVER
Victoria Cres.
TOWN
OF
MEAFORD
Nottawasaga Bay
N
Tentative
Damsite
ONT. DEPT. of P & D. · CONSERVATION BR. · W.G.M. · 1959
PROPOSED DAM
ELEVATION OF DAM
SCALE 0 5 10 20 FEET
Existing Ground Surface
Fill
Elev. 581
Elevation 596
Steel Posts
Elevation 590
Flashboards
Elevation 593
92'
114'-9"
8'
Concrete Pier
Stop Logs
Catwalk
Concrete Abutment
Elev. 583·5
PLAN OF DAM
SCALE 0 5 10 20 FEET
Stream Flow
Rip Rap
Steel Posts
Flashboards
Concrete Sill
Pier
Stop Logs
602
600
598
596
594
592
590
588
586
584

FIG. 6

Table 7 - Dams in the North Grey Region - 1949 Dam Census, Surveys Division, Department of Lands & Forests

RIVER OR TRIB.	NAME OF DAM	LOCATION	HEAD FEET	DAM LENGTH FEET	DAM HEIGHT FEET	DAM BUILT	ORIGINAL USE	USE IN 1949	COND. 1949	DAM CONSTRUCTION	REMARKS 1949 DAM CENSUS
SYDENHAM R.	Textile Dam or Owen Sound Mill Dam	Owen Sound	-	150	14	Rebuilt 1948 -1949 and 1959	Not known	Woollen Mill	Fair	concrete earth fill	New sluiceway recently constructed, gravel and clay fill added.
	Waterworks Dam	-	-	50	15	-	-	Water supply for Owen Sound	Fair	concrete	-
	Inglis Falls	Inglis Falls	37	50	12	-	Mill	Swimming	Fair	solid concrete	Should be removed as it holds water under sun and spoils downstream area for trout.
	Hemstock's Dam or Sullivan Mills	-	9.5	120	15	Rebuilt 1916	Saw,Flour and Grain Mill	Grist Mill	Fair	earth	Dam washed out in 1916 and was rebuilt.
BIG HEAD R.	-	Massie	20	200	15	1939	Chopping Mill	Saw Mill	Good	earth-fill cement-facing	Actual cement work is only 5' in ht. Earth fill is 15' behind conc. facing.
	-	Meaford	10.5	-	-	1850	Woollen Mill	Nil	Washed Out	-	Washed out in 1946 and never rebuilt.
Rocklyn Cr. (Tributary)	-	-	-	125	7	1870	Saw Mill and Grist Mill	Cattle Pond	Poor	earth and cement	Saw Mill discontinued in 1900.
Walters Cr. (Tributary)	-	-	-	75	15	1890	Saw Mill	Saw Mill	Good	solid concrete	This dam is used in conjunction with smaller dam directly downstream. Water taken from 2nd dam to feed mill.
	-	Walters Falls	38	100	20	1909	Saw Mill	Grist Mill	Good	rock and earth fill	2 dams 100 yrs. old washed out and succeeded by present dam.
	-	Walters Falls	30	25	10	1905	Saw Mill	Saw Mill	Good	solid concrete	See note on other dam owned by Hallman.
	Bognor Mills	Bognor	16	200	10	1850	Saw Mill	Grist and Saw	Poor	earth	Built in 1850; rebuilt 1900
BEAVER R.	Slabtown Dam	2 mi. above Clarksburg	7.5	280	10	Rebuilt 1945	Alfalfa and Saw Mill	Alfalfa Mill	Fair	solid cement	Rebuilt in 1945. Original date unknown.
	Clendenham Dam	-	-	500	14	1912 and 1939	Power supply for Clarksburg	?	Good	buttress	Washed out and rebuilt in 1939. Sold recently to T.W. Wilson - use unknown. Turbine operating.
	-	Thornbury	14	110	30	1921	Power and Water and Alfalfa Mill	Same	Fair	solid concrete	Built by Town Thornbury for power and water supply used to supplement Hydro.
	-	Clarksburg	15	175	10	1880-1920	Grist and Wool	Grist and Seed	Good	cement	Washed out in 1920 - rebuilt. Used to generate electricity for mill, now.
	Feversham Mill	Feversham	24	25	15	1905	Grist and Flour	Grist and Flour	Poor	concrete	-
	-	Thornbury	-	-	-	-	-	-	-	-	-
	-	Thornbury	-	-	-	-	-	-	-	-	-
Mill Creek or Beaver Cr. (Tributary)	-	Redwing	7	6	-	1895 and 1925	Grist Mill	Grist Mill	Poor	-	Original dam mud-cement dam built 1925 - washed out in 1943 - not used since. Present grist mill run by Hydro power.
Mitchell Cr. (Tributary)	-	2 mi.west of Kolapore	40	100	7	1870	Saw and Chop Mill	Nil	Poor	cement	Mill destroyed in 1947.
Kolapore Cr. (Mitchell Cr.) (Tributary)	-	Kolapore	-	45	10	1880	Grist Mill	Nil	Poor	timber crib	Mill discontinued in 1928. Dam still remains
Kimberley Cr. (Tributary)	-	Kimberley		23	-	-	-	-	-	-	-
BOYNE R. (Tributary to BEAVER RIVER)	Woollen Mill Dam	Flesherton	16	200	15	-	Woollen Mill	Woollen Mill	Fair	earth	-
	Mill Pond Dam	Flesherton	25	150	15	-	Flour and Planing Mill	Flour and Saw Mill Swimming	Fair	earth	-
	-	1½ mi.below Flesherton	19	35	12	-	Grist Mill	Grist Mill	Poor	cement	At present dam is drained and flume is being dredged.
	Nuhn Dam	Flesherton	-	219	15	1870	Woollen Mill	Woollen Mill	Good	earth and concrete	-
	McCauchlie's Pond	Flesherton	-	150	14	1870	Planing Mill	Planing Mill	Poor	concrete	-
	Eugenia Falls	Eugenia Falls	549	-	-	-	-	-	-	-	-
		In the 3 mi.below Eugenia Falls	114	-	-	-	-	-	-	-	-

CHAPTER 6

HYDROLOGY

Hydrology encompasses the behaviour of water as it occurs in the atmosphere, on the surface of the earth, and under the earth. The movement of water from the atmosphere to the earth and return again is known as the "hydrologic cycle". Many factors influence this movement, and particularly that portion between the incidence of rainfall over land areas, and the subsequent discharge through stream channels, and direct return to the atmosphere by evaporation and transpiration.

The drainage areas of the North Grey Region are subject to the constant phases of this cycle and, of course, problems exist which are peculiar to the climatic conditions and physical characteristics of the area.

1. Precipitation, Streamflow and Run-off

(a) Precipitation

The term "precipitation" as used in meteorology includes all forms of moisture which reach the earth - rain, snow, hail, etc., the most significant, being rain and snow, which are the source of all streamflow.

From records of meteorological stations in this region, and over periods ranging from 23 to 63 years, the average annual precipitation is 34 inches. This is made up of an average annual rainfall of 23 inches, and an average annual snowfall of 109 inches*. The average annual temperature is 43°F.

In some areas of Southern Ontario there are sufficient records available for generalized estimates of the precipitation amounts, but there is an urgent need for additional observation stations and more recording equipment in order to evaluate the precipitation to run-off relationship more accurately.

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* 109 inches of snow is equivalent to 10.9 inches of water.

(b) Streamflow and Run-Off

Streamflow and run-off consist of surface flow and ground water which enter the stream along its course, and are broadly the excess of precipitation over evapo-transpiration and deep seepage. Surface flow is that portion of rainfall, melted snow or ice or both, which reaches the stream channels directly by flowing over the ground surface. Ground water flow (percolation) is going on continuously and is responsible for maintaining the flow in streams during periods of drought.

Measurement and timing of surface flow, or direct run-off, are of prime concern, since these data are necessary for an accurate assessment of the particular problems of flood control, water supply, pollution and related uses which are of direct concern to Conservation Authorities.

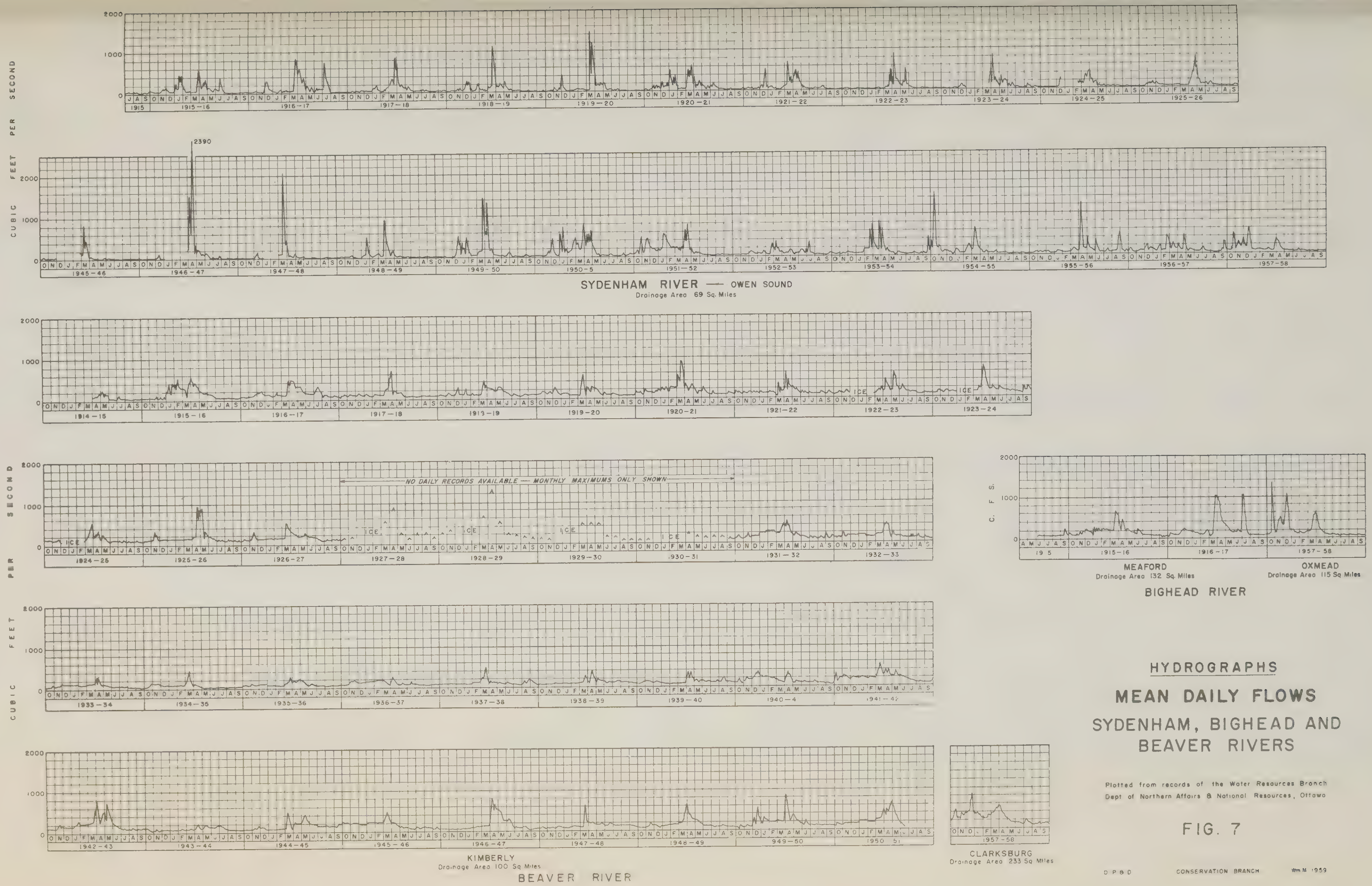
Measurement of stream flow has been recorded on the Sydenham River, near Owen Sound, for a period of 24 years, from 1915 to 1926 and from 1945 to date.

Observations of stream flow have been taken on the Beaver River at Kimberley from 1915 to 1951.

Records have been kept also for the Beaver River over the period 1918 - 1951 in connection with the Hydro Electric Power Installation at Eugenia. These records are for the specific use of the power operation and are of limited value in some phases of conservation studies as the gauge only measures part of the flow from the drainage basin above it. The balance of the water from the basin passes through the Eugenia power plant.

There was a gauge on the Bighead River near Meaford from 1915 to 1917 but was discontinued due to the effect of a grist mill operation at that time.

Two other gauges were established in 1957, one on the Bighead River near Oxmead and another on the Beaver River near Clarksburg. The gauge on the Beaver near Clarksburg is a recording instrument. Figure 7 and Table 8 show the



HYDROGRAPHS

MEAN DAILY FLOWS

SYDENHAM, BIGHEAD AND BEAVER RIVERS

Plotted from records of the Water Resources Branch
Dept of Northern Affairs & National Resources, Ottawa

FIG. 7

D.P.&D. CONSERVATION BRANCH Wm.M. 1959

MAX. & MIN. MEAN DAILY & MEAN MONTHLY DISCHARGES IN CUBIC FEET PER SECOND
FOR THE GAUGE NEAR OWEN SOUND ON THE SYDENHAM RIVER - DRAINAGE AREA = 68.8 SQ. MILES

Year	October			November			December			January			February			March			April			May			June			July			August			September		
	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean
1914-15																									51	21	26	34	18	23	46	18	28	70	14	30
1915-16	57	25	41	126	33	62	130	37	58	484	43	219	278	49	100	536	58	124	576	152	254	188	86	134	394	64	134	77	22	39	26	19	23	26	15	19
1916-17	46	15	27	104	30	39	283	57	117	86	16	47	78	22	40	822	40	238	608	139	310	190	63	107	126	63	94	771	45	220	45	30	38	30	22	25
1917-18	57	30	41	77	34	47	77	35	51	244	10	130	177	3	76	820	152	352	790	105	242	125	50	82	70	26	39	45	19	23	19	12	16	26	12	19
19	34	19	24	115	30	64	297	50	135	212	60	99	152	48	73	1120	83	287	212	96	148	255	56	110	56	22	33	26	19	20	22	12	16	34	12	15
20	69	13	25	214	34	76	401	63	114	82	50	64	85	69	79	1480	66	550	401	125	210	214	44	83	69	34	41	44	20	34	26	16	21	20	13	17
21	69	13	30	152	69	106	214	86	129	505	104	234	97	69	81	615	86	352	343	86	145	152	48	86	200	48	99	63	36	42	36	18	32	36	18	30
22	63	26	39	82	36	52	525	48	143	82	48	63	130	31	61	720	135	339	525	135	302	105	36	74	48	26	34	105	18	44	26	11	18	26	18	19
23	26	11	19	36	18	26	36	26	27	26	22	24	26	18	20	500	42	192	890	105	345	530	73	168	73	28	50	26	15	20	18	11	14	18	12	16
24	18	11	14	33	18	26	119	22	55	-	-	60	-	-	58	440	-	163	890	105	307	355	63	197	153	31	90	62	36	44	109	31	55	62	19	31
25	38	22	31	28	21	23	258	22	89	-	-	30	-	-	142	404	121	279	273	73	161	95	31	54	81	26	39	51	21	31	22	16	20	22	16	18
1925-26	81	16	27	147	56	104	-	-	86	-	-	75	-	-	61	-	-	73	785	-	330	388	80	168	211	48	86	50	21	27	28	21	23	34	21	27
1945-46	70	26	49	95	37	48	-	-	-	-	-	-	-	-	-	860	73	264	95	43	64	82	30	49	40	16	29	29	8	13	12	3	9	16	8	11
47	20	5	12	30	15	22	138	21	43	-	-	-	-	-	-	-	-	-	2390	167	590	277	112	161	158	37	79	110	27	49	59	10	24	28	7	11
48	23	7	12	34	10	23	155	32	66	-	-	-	-	-	-	2080	-	440	430	83	150	133	43	78	44	19	27	24	10	13	19	3	8	8	3	5
49	29	3	10	75	5	30	32	15	22	515	20	160	112	16	55	940	52	260	385	69	137	71	19	37	29	7	15	18	4	8	13	3	6	8	2	5
50	18	2	10	24	5	14	539	19	146	488	75	196	213	54	101	1460	79	260	1360	110	362	107	28	61	138	15	46	125	10	24	44	10	19	85	14	27
51	42	13	23	177	20	98	675	10	148	710	89	242	410	94	189	800	167	298	675	273	432	286	43	112	41	22	30	87	18	39	112	10	41	60	16	37
52	498	46	139	450	87	240	206	135	173	563	115	306	328	119	227	320	152	214	748	112	373	112	66	85	77	11	34	22	1	9	24	7	15	29	10	19
53	22	9	13	81	13	37	144	69	94	138	34	74	307	14	85	360	133	214	189	69	109	144	48	77	130	28	93	360	25	88	32	10	19	83	10	34
54	48	19	28	69	16	32	-	-	55	-	-	53	627	-	179	822	125	321	654	115	268	112	32	69	98	19	46	25	1	11	71	7	13	445	17	103
1954-55	1510	110	351	206	79	113	125	5	67	167	60	93	234	52	154	675	117	272	515	105	260	130	24	70	54	19	35	17	7	11	12	5	8	7	3	5
56	43	4	17	72	15	46	79	33	45	70	28	40	60	31	36	162	66	96	1260	83	302	404	66	124	338	33	95	145	15	52	519	15	54	384	32	81
57	113	35	54	99	35	55	324	70	126	211	54	85	435	54	102	294	75	158	420	85	148	96	45	67	101	20	37	153	16	50	18	10	14	290	9	88
1957-58	490	31	110	361	85	166	592	113	224	126	60	77	83	54	59	347	62	115	294	57	137	49	20	34	52	15	28	21	9	13	15	6	8	18	7	11
Mean			48			64			92			99			82			244			254			95			57			39			23			29

MAX. & MIN. MEAN DAILY & MEAN MONTHLY DISCHARGES IN CUBIC FEET PER SECOND FOR GAUGE NEAR KIMBERLEY
ON THE BEAVER RIVER - DRAINAGE AREA 100.0 SQ. MILES
(Records affected by operation of H.E.P.C. Dam upstream.)

Year	October			November			December			January			February			March			April			May			June			July			August			September		
	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean
1914-15																-	-	-	194	66	120	281	82	176	55	19	29	140	21	60	55	30	44	144	41	52
1915-16	-	-	-	124	49	70	132	53	73	474	124	258	508	147	263	435	82	206	520	210	330	254	137	191	174	72	129	77	45	58	49	41	45	49	31	39
16-17	72	33	51	175	52	88	293	70	156	137	52	109	206	64	113	486	70	161	494	137	290	337	121	189	175	63	130	318	82	158	115	63	90	115	58	82
17-18	137	70	93	101	52	88	152	42	90	190	47	87	130	46	91	263	74	135	695	137	303	198	89	128	115	52	82	95	46	78	101	52	82	150	52	87
18-19	101	52	87	150	64	96	285	76	114	206	70	115	147	70	98	469	81	224	362	121	225	337	158	230	190	52	122	115	32	72	108	46	85	101	52	90
19-20	152	71	96	168	83	114	245	91	127	110	96	101	95	77	87	570	77	216	293	112	178	274	91	136	152	54	93	152	59	93	91	47	70	112	28	64
20-21	168	20	95	233	71	128	205	91	146	264	127	200	274	127	197	895	223	471	325	136	217	252	72	146	216	51	103	152	44	80	96	51	75	132	44	89
21-22	152	26	114	133	20	85	162	44	103	105	30	86	114	30	96	350	23	176	612	114	301	252	72	165	194	57	103	123	57	87	114	59	70	142	34	80
22-23	133	34	96	152	34	105	-	-	-	-	-	-	-	-	-	210	44	119	452	109	216	590	75	241	288	96	159	146	41	107	109	44	81	136	44	82
23-24	152	42	79	146	42	89	207	42	99	-	-	106	-	-	93	232	65	126	735	133	259	351	138	189	202	57	121	158	49	105	117	54	88	222	54	105
24-25	144	73	110	154	82	113	-	-	112	-	-	97	-	-	124	545	110	206	333	103	150	250	81	144	189	110	128	150	68	113	122	68	98	119	70	93
25-26	125	61	100	330	77	136	-	-	124	-	-	120	-	-	124	-	-	160	925	101	349	965	108	388	345	71	145	156	63	104	167	69	107	145	69	98
26-27	160	81	114	308	91	170	-	-	139	-	-	148	-	-	174	570	110	306	354	121	222	263	98	177	183	98	150	235	98	136	160	71	110	130	71	110
27-28	144	58	107	175	92	126	-	-	135	-	-	137	-	-	124	575	-	209	900	177	421	227	121	179	160	90	126	263	78	138	294	81	156	193	97	142
28-29	263	89	167	316	114	193	-	-	236	-	-	268	-	-	193	660	-	410	1310	221	565	510	250	352	245	94	176	238	76	163	191	74	136	163	74	122
30	181	78	136	-	-	111	-	-	90	-	-	147	-	-	193	-	-	152	510	97	287	378	122	185	218	67	161	172	75	124	172	67	114	132	61	99
31	106	48	71	136	56	68	-	-	68	-	-	62	-	-	78	-	-	67	223	76	128	110	57	76	140	50	93	166	46	86	144	46	84	110	46	79
32	184	46	95	211	43	108	-	-	143	-	-	233	-	-	283	-	-	234	505	155	320	230	118	164	132	61	97	130	63	81	110	51	77	195	66	104
33	114	55	92	255	81	122	-	-	158	-	-	174	-	-	156	-	-	181	433	90	278	257	69	125	132	48	92	132	45	84	154	48	96	122	42	66
34	118	36	61	-	-	104	-	-	126	-	-	113	-	-	88	-	-	128	310	97	191	130	64	98	97	48	68	97	50	67	75	32	57	67	32	44
35	175	44	75	158	48	112	-	-	63	-	-	93	-	-	91	482	77	162	141	36	63	60	27	36	103	26	47	90	32	49	61	38	50	61	37	48
36	82	42	51	118	44	79	-	-	101	-	-	73	-	-	71	295	73	145	205	90	156	188	63	116	136	66	98	90	43	71	103	41	75	96	46	72
37	103	45	62	177	79	124	-	-	135	-	-	149	-	-	163	138	64	102	273	56	96	134	53	84	134	55	93	96	38	61	94	36	62	81	31	52
38	63	29	51	94	55	71	-	-	74	-	-	60	-	-	123	497	56	200	158	63	105	107	53	84	136	51	84	89	44	75	196	62	118	194	51	90
39	87	39	68	94	44	75	-	-	77	-	-	76	-	-	92	282	63	127	394	65	191	234	106	169	148	87	105	133	48	80	124	42	67	122	53	96
40	126	56	88	133	68	94	129	55	101	-	34	58	-	36	55	65	32	43	346	69	181	215	63	107	161	63	104	169	66	117	231	61	122	136	55	90
41	193	55	102	226	115	163	378	129	186	217	144	188	206	83	147	148	52	87	327	68	172	108	53	89	126	40	84	134	44	92	102	38	65	234	33	59
42	315	47	141	275	144	178	296	119	174	231	126	178	198	59	136	740	78	283	411	220	319	362	206	254	359	119	213	166	62	109	161	47	104	234	52	101
43	174	53	111	278	54	173	215	97	159	198	122	162	299	172	204	555	119	261	700	179	328	670	269	416	293	113	178	193	74	122	243	52	125	131	42	100
44	119	33	72	110	43	84	-	-	78	-	-	74	104	43	57	129	46	78	281	59	127	229	58	142	179	45	88	179	36	64	74	31	54	90	33	56
45	69	34	53	172	43	100	166	40	135	-	-	56	-	-	55	497	62	177	299	112	197	450	176	247	264	121	195	479	94	187	167	76	120	196	81	137
46	288	135	213	225	151	203	-	-	183	-	-	229	-	-	204	550	202	344	243	67	137	147	59	95	98	44	74	117	48	89	127	35	95	108	27	73
47	79	30	54	84	39	56	-	-	53	-	-	63	-	-	104	-	-	110	840	164	520	535	231	310	382	42	197	172	51	97	167	29	88	102	25	70
48	112	32	73	100	40	75	135	42	78	108	35	74	117	35	82	666	32	205	282	122	192	232	94	152	182	72	121	146	76	112	139	68	111	146	41	80
49	99	43	69	205	58	108	115	-	88	-	-	138	-	-	169	650	129	266	360	241	280	258	80	161	132	46	87	113	52	82	108	45	82	108	34	65
50	140	52	90	158	48	100	638	82	189	356	127	210	-	-	186	628	-	231	893	282	383	360	86	215	206	89	131	181	92	115	132	77	107	119	74	96
1950-51	150	68	117	-	82	134	-	-	160	-	-	213	-	-	197	595	176	268	829	298	478	608	116	265												
Mean			93			112			122			133			134			193			250			179			117			96			89			84

BEAVER RIVER NEAR CLARKSBURG - DRAINAGE AREA 233.1 SQ. MILES

Year	Oct. Max.	Oct. Min.	Oct. Mean	Nov. Max.	Nov. Min.	Nov. Mean	Dec. Max.	Dec. Min.	Dec. Mean	Jan. Max.	Jan. Min.	Jan. Mean	Feb. Max.	Feb. Min.	Feb. Mean	Mar. Max.	Mar. Min.	Mar. Mean	Apr. Max.	Apr. Min.	Apr. Mean	May Max.	May Min.	May Mean	June Max.	June Min.	June Mean	July Max.	July Min.	July Mean	Aug. Max.	Aug. Min.	Aug. Mean	Sept. Max.	Sept. Min.	Sept. Mean
1957-58	476	99	196	426	183	288	872	215	421	363	215	266	353	187	253	555	166	322	558	205	379	191	112	139	136	76	103	240	74	117	118	64	84	164	83	130

BIGHEAD RIVER AT MEAFORD - DRAINAGE AREA 132.0 SQ. MILES (Records affected by operation of Mill Dam.)

Year	Oct. Max.	Oct. Min.	Oct. Mean	Nov. Max.	Nov. Min.	Nov. Mean	Dec. Max.	Dec. Min.	Dec. Mean	Jan. Max.	Jan. Min.	Jan. Mean	Feb. Max.	Feb. Min.	Feb. Mean	Mar. Max.	Mar. Min.	Mar. Mean	Apr. Max.	Apr. Min.	Apr. Mean	May Max.	May Min.	May Mean	June Max.	June Min.	June Mean	July Max.	July Min.	July Mean	Aug. Max.	Aug. Min.	Aug. Mean	Sept. Max.	Sept. Min.	Sept. Mean
1914-15																			-	-	-	-	-	-	92	41	59	63	32	44	99	17	51	201	36	57
15-16	143	52	75	195	47	124	211	94	146	285	67	182	239	154	201	693	163	234	630	172	292	219	119	158	276	98	146	98	43	64	56	33	46	49	0	34
16-17	121	0	64	198	0	81	184	124	151	148	50	102	164	42	72	1030	3	278	1060	318	579	326	121	198	205	103	138	1070	76	287	107	7	68	76	3	53

BIGHEAD RIVER NEAR OXMEAD - DRAINAGE AREA 115.4 SQ. MILES

Year	Oct. Max.	Oct. Min.	Oct. Mean	Nov. Max.	Nov. Min.	Nov. Mean	Dec. Max.	Dec. Min.	Dec. Mean	Jan. Max.	Jan. Min.	Jan. Mean	Feb. Max.	Feb. Min.	Feb. Mean	Mar. Max.	Mar. Min.	Mar. Mean	Apr. Max.	Apr. Min.	Apr. Mean	May Max.	May Min.	May Mean	June Max.	June Min.	June Mean	July Max.	July Min.	July Mean	Aug. Max.	Aug. Min.	Aug. Mean	Sept. Max.	Sept. Min.	Sept. Mean
1957-58	833	31	132	577	100	218	1040	146	318	186	108	135	159	96	107	553	100	178	605	110	264	113	32	63	95	23	39	38	16	24	51	12	19	43	11	18

hydrographs and recorded stream flow measurements available to date.

As previously indicated, the factors affecting run-off are numerous and varied, and appear in so many combinations that it is difficult to classify them in terms of their direct effect. Run-off is the resultant of all the watershed characteristics and, though it reflects the combined influence of the various factors on the precipitation that falls on the area, it does not indicate the significance of any one factor.

2. Low Flows

From the available records of stream flow for all gauges in the Region shown in Table 8, it appears that the minimum mean monthly flows occur during July, August and September.

There are other occasions during October and November when the mean monthly flow was as low, and even lower than the average of the July, August or September periods, but these were exceptions and the direct result of prolonged dry spells.

The minimum discharges observed over the period of record are as follows:

Sydenham at Owen Sound	July 1952 & 1954	1 c.f.s.
Beaver at Clarkesburg	August 1958	*64 c.f.s.
Beaver near Kimberley	November 1921 October 1920	20 c.f.s. 20 c.f.s.
Bighead near Meaford	September, October and November 1916 September 1917	0 c.f.s. 3 c.f.s.
Bighead near Oxmead	September 1958	11 c.f.s.

* Average daily discharge from Eugenia H.E.P.C. reservoir is 60$\pm$ c.f.s.

It is apparent from the above figures, that discharges are critical during the months of July, August and September. It should be remembered that the above figures are for the areas above the gauges, and it is certain that many of the smaller tributary areas must dry up completely during the summer and early autumn seasons of some years.

The same may be true for the Beaver as for the Bighead when not taking into account the operation of the Eugenia Hydro Electric Power Commission plant, which discharges an average daily of $60^{\pm}$ c.f.s. This flow alleviates the problem of low-flow on the Beaver River and indicates the benefit of reservoir storage during low-flow periods.

This discharge from the Eugenia reservoir is confined to the main stream, of course, and it is quite likely that some of the tributary areas of the Beaver would also be dry during the usual low-flow months of July, August and September.

The following table shows the minimum daily flows and the number of occurrences, by months, for the Sydenham River at Owen Sound for the 25-year period of record.

NUMBER OF OCCURRENCES WHEN MINIMUM DAILY DISCHARGE WAS EQUAL OR LESS THAN 5 CUBIC FEET PER SECOND

Month	Minimum flow in cubic feet per second					
	5	4	3	2	1	Total Occurrences
July	-	1	-	-	2	3
August	1	-	3	-	-	4
September	-	-	2	1	-	3
October	1	1	1	1	-	4
November	2	-	-	-	-	2

On many occasions the minimum discharges shown in the above table occurred in consecutive months and are not meant to be used to establish frequency of occurrence. During the period 1915 to 1926, a period of 12 years, on no occasion was the observed flow as low as 5 c.f.s. From 1946 to 1958, a

period of 13 years, there were nine years in which the observed minimum flow was equal to or less than 5 c.f.s.

These discharges are daily observations and though indicating the depleted river volume, usually last for only a few days or a week at most, although there was one occasion where the discharge did not exceed 5 c.f.s. for a period of 17 days. This occurred in July 1952.

In September 1948, 1949 and 1955, the mean monthly flow of the Sydenham River was 5 c.f.s.

In establishing criteria in relation to low flow problems it is more reasonable to plan in terms of the mean monthly flows rather than the daily minimums, which cover only a few days or a week, periodically, as it is usually too extreme economically.

The Bighead River registered zero flow during three consecutive months, September, October and November 1916, with a minimum mean monthly flow of 33 c.f.s. being recorded for September. There are only three years of flow records for this river.

The minimum monthly mean observed for the Sydenham River at Owen Sound was 5 c.f.s., and this could be considered as extreme for this river.

The annual daily discharge from the Eugenia Reservoir is reported as 60± c.f.s. By examination it can be seen that without this discharge the flows would be as low proportionately as those of the Sydenham. A great deal depends, of course, on the climatic conditions and the power demand, as there are short periods in the order of a few days, when the daily discharges recorded at Kimberley have been 20 c.f.s. However, over the longer period this is increased to the extent that the minimum mean monthly flow over a period of 36 years is 84 c.f.s. at Kimberley.

At first glance the quantities recorded, on the average, appear to be adequate for normal use, except for occasional drought periods. However, this depends a great deal on distribution, the present water requirements, and particularly the future needs of the specific area in question.

Also, as flows of greater magnitude than those recorded to date may reasonably be expected in the future, so drier periods may also be expected and should be provided for.

3. High Flows

(a) Spring Freshets

In most areas of Southern Ontario high flows usually occur during the spring freshet period as may be seen from the flow records of those rivers which have been gauged for many years. However, where river control structures are concerned, it is not the usual or average flows but the unusual, or exceptional ones that have occurred in the past, or may reasonably be expected to occur in the future that are significant. These flows provide the basic design criteria for all water control structures, and particularly the major ones, where failure could result in loss of life, and destruction of property.

It is necessary, therefore, in the analysis of the available data, to consider probable maximum conditions in direct relation to the human and economic factors involved.

From the records available for the North Grey Region it is evident that the high flows occur most frequently during the spring period, with occasional high flows occurring in the winter due to thawing, and in the summer and autumn following intense rainstorms. Generally the spring freshet periods produce the highest flows.

The maximum mean daily discharges for the period of record are as follows:

River	Gauge Location	Dr. Area Sq. Miles	*Flow c.f.s.	Date
Sydenham	Owen Sound	70	2390	Apr. 1947
Bighead	Near Oxmead	113	1040	Dec. 1957
"	Meaford	132	1070	July 1917
"	"	132	1060	Apr. 1917
Beaver	Clarksburg	221	872	Dec. 1957
"	Kimberley	100	1310	Apr. 1929

* Mean Daily

It is pointed out that the above recorded flow figures are mean daily values and that the actual peak flows would be in excess of these. The probable corresponding peak flows calculated by formula would be 2,870, 1,250, 1,280, 1,170, 960 and 1,960 c.f.s., respectively.

Snowfall amounts contribute approximately 32 per cent of the annual average precipitation of this area which is fairly high in comparison with those areas to the south, which drain into Lake Ontario and Lake Erie. Therefore, the geographic location of this area, owing to snow accumulation and snow melt, has direct bearing on the spring run-off.

It is also probable that flows of greater magnitude may have occurred on all three rivers before records were kept but, as there are no actual data available, it is difficult to estimate what may have happened in the past.

There are references in newspapers and diaries, and eye-witness accounts of high river discharges, but it appears that serious flooding is not frequent. The newspaper accounts of flooding in this region dating back to 1869, indicate that any flooding worthy of mention occurred during spring periods due to the usual thaw accompanied by rain, and occasionally aggravated by ice jamming at constrictions along the rivers.

(b) Other than Spring Freshets

In recent years, however, it has become apparent that flood run-off resulting from rainfall alone without the aid of melting snow and ice can be significant and in some instances has exceeded that of the spring period.

A very obvious example of this was the disastrous hurricane storm of October 1954, which caused such wide-spread flood damage over areas of Southern Ontario. Since that time a new concept of the run-off-producing storm for Ontario has been gained, particularly in relation to flood protection and the design and operation of flood control structures.

Even with improved methods of design storm analysis, the lack of data, both in quantity and quality, leaves much to be desired, but with the contribution of hydro-meteorology, a more rational approach to the solution of the run-off-producing potential of the various storm types may be achieved.

4. Estimated Flows

(a) Unit Hydrograph Method

Where reasonably accurate rainfall and stream flow records are available, the use of the unit hydrograph method is best suited to the problem of design storm flow.

Stream flow records for the North Grey Region, with the exception of the Sydenham and Beaver Rivers, are of short duration and usually the observations are taken only once or twice a day.

Two of the gauges which are operating at the present time, one on the Bighead River and the other on the Beaver, are of such recent establishment that sufficiently accurate rating curves have not been developed to attempt to deduce flows of the design storm magnitude.

There are three rainfall observation stations within the boundaries of the Region but none of these is of the recording type. In order to obtain the actual time periods

of rainfall it is necessary to depend on the alertness and interest of the observers to note the beginning and end of the rain periods.

The nearest recording rain gauge from the centre of the Region, is approximately 60 miles distant and is, therefore, of little use in determining actual rainfall durations and intensities.

It is, therefore, necessary to rely on mean daily flow records, daily rainfall amounts, unofficial observations and empirical formulae to determine the peak flows which are so necessary in the design and operation of river structures.

For the area above the gauge on the Sydenham River, an attempt was made to compute unitgraphs from the data available with the following results:

Results of Unitgraph determination for Sydenham River at Owen Sound				
Date of Rainfall Occurrence	Unit *Peak Flow c.f.s.	Rainfall Depth in inches	Rainfall Duration Hours	Run-off Percentage
Oct. 1951	1780	.95	24	30
July 1953	1325	1.65	9-12	14
Oct. 1954	1345	3.86	48	31
May-June 1956	1360	1.24	12	15
Aug-Sept 1956	1140	2.36	18	17
Apr-May 1956	1350	2.03	48	14
Oct. 1957	1380	2.12	72	15

* Peak determined by Langbien method

From an examination of the above figures it may be seen that the results are anything but conclusive, and are not consistent in terms of the flow-duration relationship.

The most reliable in terms of rainfall duration appear to be the July, 1953 and the May-June, 1956, results. As the flow units were all deduced by the same method, there is

little choice. Therefore, it appears reasonable to accept the results of these two periods, and by taking the average $\frac{1325 + 1360}{2} = 1342$, we may assume a 12-hour unit hydrograph for this particular area.

The method used to determine peak flows for use in the unitgraph computations was that suggested by Langbien*, where ratio of peak flow to maximum daily flow are shown as functions of the ratios of mean flow on the maximum day to the average flow on the days immediately preceding and following the maximum day.

The resulting ratio from the records available for the Sydenham River was 1.15 (average of 5 flow periods) and for the Bighead River 1.21 (average of 4 flow periods). These are average ratios based on the number of periods noted in each case, and include mostly summer and autumn periods where ice was not an influencing factor.

The flows of the Beaver River at Kimberley are so affected by the operation of the power dam at Eugenia that any attempt to determine a ratio of mean to peak flow by this method is useless.

The Langbien chart from which these ratios were procured, is based on data from drainage areas in the United States, but the units used, and the basic reasoning involved should make this method applicable in many places outside of the areas from which the data were procured. There is no doubt that more reliable results could be obtained from charts developed from data from the specific areas under consideration, but as in this case there are practically no reliable data available, it is felt that the ratios derived from the Langbien method are sufficiently adequate for the present purposes.

(b) Synthetic Hydrograph Method

In the absence of sufficient observations of good quality on the Beaver and Bighead Rivers, it is necessary to

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* Langbien, W.B., Peak Discharge from Daily Records, U.S. Geol. Survey - Water Resources Bull., Aug. 10, 1944.

resort to means, other than the Unitgraph method, to estimate the probable maximum flows for these areas.

There are various methods to achieve this estimate, but all may be relegated to two classifications, namely; the Rational Method, and the Synthetic Unitgraph Method. Basically, both are similar in many respects in that they depend largely on the natural basin characteristics to determine the constants, which, when included in the standard empirical formulae will permit solution of the equations.

The Rational Method* (Modified) approaches the problem directly, and sets the objective in terms of return period frequency.

On the other hand the Synthetic Unitgraph Method† is more flexible in that it is expressed in terms of the maximum run-off-producing rainfall for the particular area, and may be applied to other storms of known quantity and time of duration. This is the method that is used later to calculate the peak flows and unit run-off rates for the other streams where actual flow data is lacking.

5. Design Flows

The "design flood" flow is generally referred to as the peak discharge that is adopted as the basis for the design of any river control structures. This discharge is dependant on consideration of the flood flow characteristics of the particular area, and on economic and social factors as well.

Except in cases where the maximum degree of protection is mandatory, where loss of life, or excessive damage to valuable property is concerned, it is usually practical to accept a limited degree of risk in the design, and location of structures.

Flooding damage in the North Grey Region has not been excessive, and the extent and occurrences are outlined in

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*Merrill Bernard, Low Dams, National Resources Committee, Washington, D.C., 1938.

†Franklin F. Snyder, Hydrologic and Hydraulic Analyses, Corp of Engineers, U.S. Army, Engineering Manual, Part CXIV, Chap. 5, March 1948.

another section of this report. The actual records show that excessive run-off usually occurs during the spring season, particularly March and April.

However, since the occurrence of Hurricane Hazel in October, 1954, and with the knowledge that storms of greater intensity can occur, it is recognized that storms of this type may produce run-off in excess of any previously experienced during spring freshet periods.

(a) Hurricane Hazel

The hurricane-type storm known as "Hazel", which occurred in October, 1954, extended as far as the North Grey area, but its effect was not as severe as farther south where it caused extensive damage, and loss of life.

Rainfall amounts, as recorded for the region, are shown in the following table:

TOTAL RAINFALL OVER NORTH GREY REGION DURING HURRICANE HAZEL

Station	Rainfall - Inches		
	Oct. 14	Oct. 15	Total 48 hrs.
Chatsworth	0.95	2.72	3.67
Owen Sound	0.83	3.26	4.09
Collingwood	0.65	3.31	3.96
Durham	0.86	3.09	3.95
Eugenia	0.35	3.28	3.63

From the above data the average 48-hour rainfall over the whole Region would be in the order of 3.75 inches which is a fairly large amount for an area of this size.

As in most areas of Southern Ontario, this area also had intermittent rains of varying quantity over the two weeks prior to the arrival of this storm, and was therefore in a somewhat saturated condition. That is to say, the area was not in a state that would be expected to absorb any great part

of the rainfall that occurred. Normally with such amounts, and with conditions as indicated in most areas, some flooding would be expected.

However, there were no reports of any serious flooding in the area due to this storm.

The discharge recorded at the gauge on the Sydenham River at Owen Sound was estimated as 1,765 c.f.s. This is a peak flow and equivalent to 25 c.s.m. or a run-off of about 31 per cent. There are only two other occasions when this discharge was exceeded, namely; April 1947 and March 1948.

This is not a high rate of run-off considering the amount of rainfall and the conditions existing at the time. This might be attributed to the extended period of the storm, its distribution, and particularly to the drainage area characteristics which influence the run-off.

Unfortunately there was only one stream gauge operating in this region at the time of this storm at Owen Sound on the Sydenham.

(b) Hurricane Hazel centred on Area

Hurricane Hazel as it occurred over the North Grey Region did not produce run-off in the spectacular manner which occurred farther to the south, but it is meteorologically possible that a storm of this type could occur directly over this region, with similar devastating results.

To estimate the effect of this storm centred on the area, the total storm rainfall map was superimposed over the North Grey Region Watershed areas to produce the maximum rainfall quantities in terms of depth in inches on the area.

The rainfall map was obtained by making use of all available official records, plus the addition of reliable unofficial observations obtained from areas where no official observation stations are maintained. The average depth in inches on the areas as determined from the superimposed isohyetal map for the 48-hour periods is as follows:

Watershed	Drainage Area	Rainfall-Depth on Area
Sydenham	80 square miles	10.6 inches
Beaver	235 " "	9.6 "
Pottawatomi	38 " "	10.8 "
Bighead	132 " "	10.1 "

Though some light intermittent rain occurred before and after the intense storm period it is generally accepted as a 48-hour storm.

One of the most significant factors in determining run-off is the run-off coefficient, regardless of which of the many techniques and empirical formulae is used. This coefficient depends on a variety of factors and combinations thereof and is most uncertain, varying widely with the degree of perviousness of the watershed area, season of the year, general climatic conditions, previous precipitation, rainfall intensities etc.

Where accurate rainfall and streamflow observations have been made, the determination of this coefficient is simplified, and the degree of accuracy varies directly with the quality and quantity of available observations.

In this area, the observations on the Sydenham River may be accepted with some degree of confidence. The other areas within the Region are deficient in data required for a reliable determination of the run-off coefficient. Consequently the design flood flows for the Bighead and Beaver Rivers have been computed by empirical methods.

From the data available for the Sydenham area, the highest percentage of run-off computed, other than spring, which is greatly influenced by snow and ice etc., was 31 per cent, and this occurred during the storm of October, 1954.

On another occasion it was 30 per cent in October, 1951. Other percentage run-off figures ranged from 14 to 31 per cent, depending on the variety of factors.

However, as we are mainly concerned with a storm of large proportions and its consequent peak discharge, the

problem becomes one of determining the run-off factor for this particular storm.

As previously stated the run-off from storm Hazel as it actually occurred in this area was 31 per cent, and this resulted from a rainfall of approximately 3.75 inches on the area, in a time period of 48 hours. This is for the area of the Sydenham River only. Should a storm of this magnitude centre over the area with a total 48-hour rainfall of 10.6 inches it is assumed that the run-off would approach 60 per cent.

By applying the results of the unitgraph determination to the Sydenham area, and assuming the 60 per cent run-off factor, the resulting peak flow at the Owen Sound gauge from storm Hazel centred on the North Grey Region would be 6,930 c.f.s. or 99 c.s.m.

(c) Probable Maximum Flows

A depth-duration-area analysis of hurricane-type storms, indicates that a total 48-hour rainfall of 17.2 inches could occur over the area of the Sydenham Watershed in 48 hours. This would result in discharges far in excess of any experienced to date in this area. In addition to the hurricane-type storms, thunderstorms, which are more frequent in this area, are often accompanied by intense rainfall, and frequently produce higher rates of run-off from areas of 500 square miles or less.

The storm likely to produce the most critical conditions for an area the size of the Sydenham Watershed, because of its shape and concentration time, was determined to be the 12-hour thunderstorm.

The probable maximum rainfall for a 12-hour thunderstorm on an area of 70 square miles as derived from the depth-duration-area analysis of storms of this type which have occurred in the United States and are considered transposable to this area, is 15.2 inches.

Because of the general nature of the soils, and the general physical characteristics of the area, and the known

values of run-off, it is estimated that the run-off factor for this probable maximum 12-hour thunderstorm would be in the order of 70 to 75 per cent.

Using the 75 per cent factor, the run-off would be 11.4 inches. Applying this to the computed 12-hour unit peak value of 1,342 c.f.s., results in a peak flow for the area above the gauge at Owen Sound of 15,320 c.f.s, or 218 c.s.m.

This figure may be used for purposes of preliminary estimates at present, but should be verified as soon as data of better quality become available.

A summary of the foregoing unit run-off rates, together with the calculated rates for the Beaver, Bighead and Pottawatomi Rivers are given in Table 9.

[illegible]

TABLE 9 - SUMMARY OF PEAK FLOWS AND UNIT RUN-OFF RATES FOR SELECTED STORMS

River	Drainage Area Sq. Mi.	Hazel Actual			Hazel Centred			Probable Maximum 12-hr Thunderstorm			Probable Maximum 48-hr Hurricane		
		Prec. Ins.	Peak Flow c.f.s.	Peak Flow c.s.m.	Prec. Ins.	Peak Flow c.f.s.	Peak Flow c.s.m.	Prec. Ins.	Peak Flow c.f.s.	Peak Flow c.s.m.	Prec. Ins.	Peak Flow c.f.s.	Peak Flow c.s.m.
Sydenham	70	3.75	1,765	25	10.6	6,930	99	15.2	15,300	218	17.2	11,300	161
Calculations based on actual flow records													
Pottawatomi	38.3	No data available						15.5	12,700	330			
Bighead	123	No data available			10.1	10,200	83	14.2	26,300	213	16.6	16,700	136
Beaver	221	No data available			9.6	15,700	71	12.7	35,700	161	15.8	26,000	117
Calculations based on synthetic computations													

CHAPTER 7

FIELD SURVEYS

All surveys made during this study were of a preliminary nature.

Fourteen locations were selected from topographic maps as possible reservoir sites. These were examined in greater detail and twelve were surveyed for the preparation of contour plans by stereo-projection from aerial photographs. Two of these, the Oxmead and Inglis Falls sites, were completed and maps were drawn at a scale of 200' to 1" with 5' contour intervals. The horizontal scale of the photographs was accurately determined by check chaining stretches of roads or fence lines which could be readily identified on the photographs.

The vertical control for the mapping was done by establishing Bench Marks at the upper and lower ends of the reservoir by means of checked lines of levels. The intermediate spot elevations were obtained by using Wallace and Tiernan Type F.A. 176 precise altimeters. The storage capacities of the Oxmead Inglis Falls Reservoirs were measured from the plans prepared by the above method and are believed to be correct within five per cent. The contour plans of these reservoirs were prepared from aerial photographs using a Wild A-9 stereo-projector.

Levels run in this survey were commenced from Geodetic Survey of Canada Bench Marks located within the Region. A total of 93 additional Bench Marks were established along more than 100 miles of base levels. These Bench Marks will expedite any further work in the area particularly should it be decided to proceed with the construction of a reservoir.

CHAPTER 8

SUMMARY

This report gives an account of the physical characteristics of the watershed and the problems arising from man's demands and uses of the natural resources as applied to water.

Chapter 1 outlines the general characteristics of the Region and provides statistics as to the size and shape of the area, types of soils, areas, populations, maximum lateral slopes, wooded areas, wet and scrub areas, etc. It also gives the lengths and gradients of the streams within the Authority.

Chapter 2 gives an interesting review of the known records of former floods. These start as far back as 1857, and continue with later reports from newspapers and diaries until the present day.

Chapter 3 discusses the water problems arising in the area and points out the need for a close study of water conservation practices. Although pollution generally is not a major problem in the watershed at the present time, it is important that every effort be made to alleviate the pollution that does exist and that the necessary precautions be taken to maintain the rivers and harbours in a good condition. It is further recommended that the Authority consider the possibility of increasing summer flow in the Sydenham River by the construction of a dam and reservoir.

The chapter also discusses the problem of the sedimentation of Meaford Harbour. From dredging records, it was found that 553,634 cubic yards of material had been deposited in the harbour during the past 58 years. This represents a volume equal to 342 acre feet of soil, or six inches of soil covering 684 acres of land. The source of this sediment is discussed and recommendations made as to how it may be reduced. It is suggested that a "small valley" scheme be started and that investigations be made into the most economical method of

preventing channel erosion in the roadside ditches and river channels. A plan of the proposed small valley scheme is also shown.

Flood problems are also discussed and it is emphasized that the Authority should recognize its responsibility in this respect. The causes of flooding are pointed out and recommendations are made to establish a flood warning system and to control the commercial or residential development of flood plains.

Chapter 4 concerns the available water storage in the Region. The need for sound planning and correct field husbandry practices is emphasized. The chapter also contains the brief description of 13 reservoir sites located on the Sydenham and Bighead Rivers with the recommendation that the land of certain ones should be purchased.

Chapter 5 deals with community ponds which would serve for either recreation or as a source of limited water supply for domestic use or fire protection. The necessity for increased emphasis on the development of these recreational facilities is pointed out and a recommendation is made that the Authority proceed with a long-term plan of community pond development. A list of a number of pond sites is presented as a guide for this plan.

Chapter 6 presents a study of the hydrology of the area. This includes a summary of the available precipitation and stream flow records. These show that the minimum flows occur during the late summer and early autumn months; and the peak flows generally occur during the months of April, May, September and October. The maximum flow recorded on the Sydenham River was 2,390 c.f.s. which occurred in April 1947. It is quite possible that the actual peak flow during this storm reached 4,180 c.f.s. The chapter also deals with unit hydrographs, estimated flood flows and design flows.

Chapter 7 provides information about the methods used and tolerances attained during the actual field surveys.

This information regarding the accuracy and method of producing the maps and drawings found herein will be of use to technical personnel who may be engaged to prepare detail plans for the construction of any of these projects.

ABBREVIATIONS, EQUIVALENTS AND DEFINITIONS

Abbreviations

ac. ft.	is the abbreviation for acre foot which is the equivalent to 43,560 cubic feet and is the quantity of water required to cover one acre to a depth of one foot.
c.s.m.	is the abbreviation for cubic feet per second per square mile and is the average number of cubic feet of water flowing per second from each square mile of drainage area.
c.f.s.	is the abbreviation for cubic feet per second and is the unit generally used to express discharge or the rate of flow.
G.S.C.	is the abbreviation for Geodetic Survey of Canada which refers to the official datum of elevations above mean sea level as established by the Geodetic Survey of Canada.
M.P.N. or m.p.n.	most probable number
ML or ml.	millilitre
P.P.B. or p.p.b.	parts per billion
P.P.M. or p.p.m.	parts per million
PH or ph	value measure of acidity or alkalinity

Equivalents

1 c.f.s.	= 6.25 imperial gallons per second
1 c.f.s. for 1 day	= 1.98347 acre feet or approximately 2 acre feet
1 c.f.s. for 1 year	= 724 acre feet
1 ac. ft.	= 271,472 Imperial gallons

1,000,000 Imp. gallons per day = 1.86 c.f.s. = 3.6836 ac.ft.

Definitions

AQUIFER is a water-bearing stratum or formation.

BASE FLOW is that portion of the stream flow which originates from the ground water storage.

BOOST STORAGE is the storage required to increase the head of water over the discharge tubes in order that they may be able to discharge the required flow.

CHANNEL CAPACITY or "IN-BANK" FLOW is the maximum flow which is contained within the river banks and does not overflow the adjacent low lands.

CHANNEL CAPACITY STORAGE is the volume of water that must be impounded in order that the stream flow will not exceed the channel capacity flow or stage.

CONSERVATION STORAGE is that volume of water remaining in a reservoir which may be used to augment the low flows and is equivalent to the maximum storage capacity of the reservoir less the dead storage, evaporation and ice losses and the space reserved for flash floods.

DAM is a structure in and across a river valley to impound control and otherwise regulate the river flow.

DEAD STORAGE is the amount of water kept in a reservoir at all times for the purpose of protecting the artificial and natural water seals at the base of the dam.

DISCHARGE TUBE or CONDUIT is an opening through the base of the spillway to provide means for discharging water when the water level of the reservoir is below the spillway level.

FLOOD is an overflow or inundation coming from a river or other body of water.

FLOOD CONTROL is the prevention of flooding by controlling the high water stages by means of storage reservoirs, dikes, diversions or channel improvements such as widening, deepening and straightening.

FLOOD CONTROL STORAGE is the total volume of water that must be impounded during a given flood in order that the stream flow will not exceed the channel capacity flow or stage and is equal to the sum of the channel capacity, dead, boost and operational storages.

FLOOD CREST is the maximum height or stage that the flood waters reach during any one flood period.

FLOOD HYDROGRAPH - a hydrograph which covers only the flood period or time interval during which the river flow is above the flood stage.

FLOOD RATIO is the ratio of peak flow to the average flow for the flood period.

FLOOD STAGE is an arbitrary flow stage which varies from place to place and from season to season and is that flow or water level at which the water threatens to do damage.

FREEBOARD is the vertical distance between the maximum permissible water level and the top of the dam or dikes.

GROUND WATER is the portion of the subterranean water which occurs in the zone of saturation.

GROUND WATER STORAGE or RESERVOIR is a term used interchangeably with aquifer.

HYDRAULICS as applied to conservation deals with the measurement and control of run-off from river drainage basins.

HYDROGRAPH is a plot of flow against time and is a correct expression of the detailed run-off of a stream resulting from all the varying physical conditions which have occurred on the drainage area above the gauging station previous to the time which it represents.

HYDROLOGY is the science which deals with the occurrence and distribution of water in its various forms over and within the earth's surface. As applied to conservation it deals more specifically with that portion of the hydrologic cycle from precipitation to re-evaporation or return of the water to the seas and embodies the meteorological phenemena which influence the behaviour of the waters during this phase of the cycle.

OPERATIONAL STORAGE is additional storage that is required to provide a safety factor to enable the controller to regulate the discharge from a dam so as not to exceed the channel capacity flow or stage.

RATE OF RUN-OFF is the rate at which water drains from an area. Usually expressed in cubic feet per second (c.f.s.).

RATE OF RUN-OFF PER SQUARE MILE is the average number of cubic feet per second of water flowing from each square mile of area drained (c.f.s./sq. mi. or c.s.m.).

RESERVOIR is the body of water created by the construction of a dam.

RESERVOIR CAPACITY is the maximum amount of water that may be contained within the reservoir without exceeding the maximum permissible water level. Usually expressed in acre feet.

RUN-OFF is the amount of water which reaches the open stream channels and may be broadly defined as the excess of precipitation over evaporation, transpiration and deep-seepage.

RUN-OFF DEPTH IN INCHES is the depth to which the area would be covered if all the water flowing from it were conserved and uniformly distributed over the surface.

SPILLWAY is that part of a dam over or through which the water is discharged.

SPILLWAY CAPACITY is the maximum amount of water that may be discharged over the spillway without exceeding the maximum permissible water level in the reservoir.

STREAM GAUGE is a measuring device used to determine the elevation of the water surface at selected points - usually a graduated rod fixed in an upright position and set to a known elevation from which the gauge readings are obtained by direct observation. Automatic type gauge is a mechanically operated recording instrument which gives a continuous record of water surface elevations.

WATER or CLIMATIC YEAR is a 12-month period from October 1 to September 30. The water year was found to be a more convenient form than the calendar year for the purpose of stream flow studies as it groups together those months in which the water losses due to evaporation and vegetation demands are at a minimum (October - March) and those during which the losses are high (April - September).

WATER TABLE is the upper surface of the zone of saturation.

ZONE OF SATURATION is the portion of the earth which is saturated with water.

NORTH GREY REGION CONSERVATION REPORT

WILDLIFE

ONTARIO DEPARTMENT OF PLANNING AND DEVELOPMENT

CONSERVATION BRANCH

CHAPTER 1

INTRODUCTION

Planning for the management of fish and wildlife resources in Southern Ontario is a useful branch of overall land use planning. The hunter and fisherman regard the opportunity of seeking game and fish with a reasonable chance of success as healthy pursuits which are an excellent antidote to the stresses of modern life. The increasing numbers of naturalists, photographers and other citizens who enjoy a walk or a drive through the country-side derive great satisfaction and pleasure from seeing the varied forms of wildlife in attractive environments.

With careful handling of the places in which the various kinds of fish and wildlife live and by controlling their numbers, it should be possible to carry out most good land use and forestry practices with no adverse effect from wildlife populations. Indeed the best farm husbandry, the best land management and the best methods of handling mixed woodlands, (at least), normally go hand in hand with good wildlife conditions. The chief subjects in which there is a conflict of interest between those who wish to make the maximum profit from agriculture and those who are also interested in seeing or using thriving populations of wildlife are the treatment of the fence lines and the treatment of wetlands.

Planning for wildlife in Ontario is already the full-time occupation of an entire Division of the Department of Lands and Forests. A District Biologist at Hespeler and a group of Conservation Officers strategically located through the North Grey Region provide advice to the average citizen. The present report, based on a short-term examination, deals only with one specific problem, the management of the streams and lakes in the watershed concerning fish

life, and for those interested, the general problem of improving farms for wildlife. There are also lists of all the large species of wildlife known to inhabit the watershed.

CHAPTER 2

FORMER CONDITIONS

The changes in conditions for wildlife which accompany the swing from forest to agriculture inevitably are followed by the disappearance or reduction of many species. On the other hand there are animals that find the change beneficial. Many species prefer life in open grassy fields and along hedges to life in the deep woods. Some species prefer proximity to man and his buildings.

It is therefore not surprising that the moose*, marten, fisher and lynx have been supplanted in the North Grey Region by the cottontail, the European hare, the woodchuck, and by increased numbers of the red fox and the skunk. Elk horns and bones of the marten were found many years ago in a cave near Redwing, in the Township of Collingwood†. The marten is considered to have remained in the North Grey Region until approximately the year 1900.

Bones of the Wild Turkey have been found at an Indian site where excavation was made in Collingwood Township, and the range of this species certainly included the North Grey Region.

The Passenger Pigeon** was an important source of food to the early settlers. It also provided some of the world's most spectacular sights when in mass migration. Several of those in the North Grey Region were reported in the literature and in correspondence, for example numbers "too large to count" reported by John Jamieson of Meaford in 1856. The species was

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* Reported by Wm. Scott (describing conditions prior to 1845) quoted by E. L. Marsh in "A History of the County of Grey", Owen Sound, 1931.

† Data from L. H. Beamer, Meaford.

** All references to the Passenger Pigeon are from the following:-

Mitchell, Margaret, H., "The Passenger Pigeon in Ontario", Royal Ontario Museum of Zoology Publication 1935.

evidently common in summer all over Grey County in suitable territory. There was a large nesting colony in St. Vincent Township in 1834. The pigeons declined in numbers rapidly after 1870 and very rapidly after 1880. "The last (2) pigeons near the village of Leith were killed by John Thomson (father of Tom Thomson the artist) in 1880". Three were seen in St. Vincent Township in 1893, and one pair was reported from Collingwood Township in 1895, by Alex. Dey. The extinction of this species was probably caused as much from the clearing of land as from the intensive market shooting and trapping.

CHAPTER 3

PRESENT SPECIES

The rapidly growing interest in natural history in Ontario is well known. Two factors have contributed greatly to the interest in the fauna of the North Grey Region. One of these is the presence of much spectacular country and relatively wild conditions along the cliffs and hills of the escarpment in the Beaver, Bighead and Sydenham Watersheds, and the shore area of Lake Huron which attracts many migrating waterfowl and shore birds. The other factor is the presence and leadership of various persons, particularly L. H. Beamer of Meaford and A. J. Mitchener of Collingwood, who have stimulated countless persons in field observations of birds, mammals and other species.

Because of the recreational importance of this area both for the residents and for the large numbers of people from outside the Region who visit it or pass through it, lists are here included of those species of mammals, birds, amphibians and reptiles that may be encountered.

1. Mammals

The following list of mammals which may be found in the North Grey Region was prepared with the assistance of Dr. R. L. Peterson, Curator of Mammals, Royal Ontario Museum, Toronto. The arrangement and terminology follow those in the latest check-list of the mammals of Ontario*. Species followed by an S are those for which there is already a specimen in the Royal Ontario Museum from the North Grey Region. Those followed by PR are those which may be expected in the Region from the close or overlapping range of the species on the east or west side of the Region. Those followed by DPD indicate

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* Downing, Stuart C., "A Provisional Check-list of the Mammals of Ontario". Royal Ontario Museum of Zoology, Toronto, 1948.

that they were collected or observed on the Department's survey of 1957.

MAMMALS OF THE NORTH GREY REGION

Sorex cinereus	Cinereous Shrew		DPD 1957	(6 caught)
Sorex fumeus	Smoky Shrew	S		
Blarina brevicauda	Mole Shrew		DPD 1957	(34 caught)
Condylura cristata	Star-nosed Mole	S	DPD 1957	(1 caught)
Myotis lucifugus	Little Brown Bat	S		
Myotis keenii	Long-eared Brown Bat		PR	
Lasionycteris noctivagans	Silver-haired Bat		PR	
Eptesicus fuscus	Big Brown Bat		PR	
Lasiurus borealis	Red Bat		PR	
Lepus europaeus	European Hare		DPD 1957	
Sylvilagus floridanus	Cottontail		DPD 1957	
Sciurus carolinensis	Black Squirrel		DPD 1957	
Tamiasciurus hudsonicus	Red Squirrel		DPD 1957	
Marmota monax	Woodchuck		DPD 1957	
Tamias striatus	Eastern Chipmunk		DPD 1957	
Glaucomys sabrinus	Northern Flying Squirrel	S		
Castor canadensis	Beaver	S		
Peromyscus maniculatus	Deer Mouse	S	DPD 1957	(34 caught)
Peromyscus leucopus	White-footed Mouse	S	DPD 1957	(5 caught)
Synaptomys borealis	Northern Lemming Mouse		PR	
Clethrionomys gapperi	Red-backed Mouse	S		
Ondatra zibethica	Muskrat	S	DPD 1957	
Microtus pennsylvanicus	Meadow Mouse	S	DPD 1957	(5 caught)
Rattus norvegicus	House-Rat		DPD 1957	
Mus musculus	House Mouse	S	DPD 1957	
Zapus hudsonius	Meadow Jumping Mouse		DPD 1957	(6 caught)
Napaeozapus insignis	Woodland Jumping Mouse	S		(2 caught)
Erethizon dorsatum	Porcupine		DPD 1957	
Canis latrans	Brush Wolf	S		
Vulpes fulva	Red Fox		DPD 1957	
Ursus americanus	Black Bear		PR	
Mustela erminea	Ermine	S		
Mustela frenata	Long-tailed Weasel	S		
Mustela vison	Mink		PR	
Mephitis mephitis	Skunk		DPD 1957	
Lutra canadensis	Otter		PR	
Odocoileus virginianus	White-tailed Deer		PR DPD 1957	

2. Birds

At least 205 species of birds either breed in, migrate through, or visit the North Grey Region, apart from those now extinct. The following list is based almost entirely on the records of L. H. Beamer of Meaford, where there is a very active group interested in natural history. Much valuable assistance was also received from Alfred J. Mitchener of Collingwood, a few miles east of the North Grey Region.

The birds are listed as permanent residents, winter or summer visitors, and migrants, and those known to breed in the area are also marked as such. Inevitably there must be a number of rare visitors which have not been noticed and therefore are omitted from this list. The Whimbrel (or Hudsonian Curlew), Long-eared Owl, Yellow-bellied Sapsucker, Canada Jay, Hudsonian Chickadee, Short-billed Marsh Wren and Prairie Warbler are the most likely additional species. The Common Egret. Golden Eagle, Glossy Ibis, Fulmar, and the Hoary Redpoll have all been recorded once but are not included in the list. Several of the warblers which are recorded as migrants may actually stay to nest in some of the boreal swamps of the Region.

A guide to the list follows:-

PR = Permanent Resident
M = Migrant
SR = Summer Resident
WV = Winter Visitor
* = Breeding Records available

The arrangement and the names are from the American Ornithologists Union check-list (5th Edition 1957).

BIRDS OF THE NORTH GREY REGION

Common Loon SR
Red-throated Loon M
Red-necked Grebe M
Horned Grebe M
* Pied-billed Grebe SR
Double-crested Cormorant M
* Great Blue Heron SR
* Green Heron SR
Least Bittern SR
* American Bittern SR
Whistling Swan M
Canada Goose M
Brant M
Snow Goose M
Blue Goose M
* Mallard SR
* Black Duck SR
Pintail M
Green-winged Teal M
* Blue-winged Teal SR
Shoveler M
* Wood Duck SR
Redhead M
Ring-necked Duck M
Canvasback
Greater Scaup M
Lesser Scaup WR
Common Goldeneye WR
Bufflehead M
Oldsquaw WR
King Eider M
White-winged Scoter M
Common Scoter M
Ruddy Duck M
Hooded Merganser M
Common Merganser SR
Red-breasted Merganser M
* Turkey Vulture SR
Goshawk WR
* Sharp-shinned Hawk SR
* Cooper's Hawk SR
* Red-tailed Hawk SR
Red-shouldered Hawk M
Broad-winged Hawk M
Rough-legged Hawk M
* Bald Eagle SR
* Marsh Hawk SR
* Osprey SR
Gyrfalcon
* Peregrine Falcon SR
Pigeon Hawk M
* Sparrow Hawk SR
* Ruffed Grouse PR
* Ring-necked Pheasant PR
* Gray Partridge PR
King Rail SR
* Virginia Rail SR
* Sora SR
* Yellow Rail SR
Purple Gallinule
Common Gallinule SR
American Coot SR
Semipalmated Plover M
Piping Plover M
* Killdeer SR
American Golden Plover M
Black-bellied Plover M
Ruddy Turnstone M
* American Woodcock SR
* Common Snipe SR
* Upland Plover SR
* Spotted Sandpiper SR
Solitary Sandpiper M
Lesser Yellowlegs M
Pectoral Sandpiper M
White-rumped Sandpiper M
Least Sandpiper M
Semipalmated Sandpiper M
Sanderling M
Northern Phalarope M
Parasitic Jaeger
Glaucous Gull WR
Great Black-backed Gull WR
* Herring Gull PR
Ring-billed Gull SR
Bonaparte's Gull M
Forster's Tern
* Common Tern N
Caspian Tern SR
Black Tern SR
* Rock Dove PR
* Mourning Dove SR
Yellow-billed Cuckoo SR
Black-billed Cuckoo SR
* Screech Owl SR
* Great Horned Owl SR
Snowy Owl WR
Saw-whet Owl WR
* Whip-poor-will SR
* Common Nighthawk SR
* Chimney Swift SR
* Ruby-throated Hummingbird SR
* Belted Kingfisher SR
* Yellow-shafted Flicker SR
* Pileated Woodpecker PR
* Red-headed Woodpecker SR
* Hairy Woodpecker PR
* Downy Woodpecker PR
* Eastern Kingbird SR
* Great Crested Flycatcher SR
* Eastern Phoebe SR
Arcadian Flycatcher M
Traill's Flycatcher
Least Flycatcher M
* Eastern Wood Pewee SR
* Horned Lark SR
* Tree Swallow SR
* Bank Swallow SR
* Rough-winged Swallow SR
* Barn Swallow SR
* Cliff Swallow SR
* Purple Martin SR
* Blue Jay PR
* Common Crow SR
* Black-capped Chickadee SR
White-breasted Nuthatch SR
Red-breasted Nuthatch SR
* Brown Creeper PR
* House Wren SR
Winter Wren SR
* Long-billed Marsh Wren Sr
* Catbird SR

* Brown Thrasher SR
* Robin SR
* Wood Thrush SR
Hermit Thrush M
* Veery SR
* Eastern Bluebird SR
Golden-crowned Kinglet M
Ruby-crowned Kinglet M
Water Pipit M
Bohemian Waxwing WV
* Cedar Waxwing PR
Northern Shrike WR
* Loggerhead Shrike SR
* Starling PR
Yellow-throated Vireo M
* Red-eyed Vireo SR
Philadelphia Vireo M
* Warbling Vireo SR
* Black-and-white Warbler SR
Prothonotary Warbler M
Tennessee Warbler M
Orange-crowned Warbler M
Nashville Warbler M
Parula Warbler M
* Yellow Warbler SR
Magnolia Warbler M
Cape May Warbler M
* Black-throated Blue Warbler SR
Myrtle Warbler SR
Black-throated Green Warbler M
Blackburnian Warbler M
Chestnut-sided Warbler M
Bay-breasted Warbler M
Blackpoll Warbler M
Pine Warbler M
Palm Warbler M
* Ovenbird SR
Northern Waterthrush M
Kentucky Warbler M
Connecticut Warbler M
Mourning Warbler M
Yellowthroat M
Yellow-breasted Chat
Hooded Warbler M
Wilson's Warbler M
Canada Warbler M
* American Redstart SR
* House Sparrow SR
* Bobolink SR
* Eastern Meadowlark SR
* Redwinged Blackbird SR
Orchard Oriole M
* Baltimore Oriole SR
* Common Grackle SR
* Brown-headed Cowbird SR
* Scarlet Tanager SR
* Cardinal SR
* Rose-breasted Grosbeak SR
* Indigo Bunting SR
Evening Grosbeak WR
* Purple Finch SR
Pine Grosbeak WR
Common Redpoll WR
Pine Siskin WR
* American Goldfinch SR
Red Crossbill
White-winged Crossbill WM
Rufous-sided Towhee M
* Savannah Sparrow SR
Grasshopper Sparrow
Le Conte's Sparrow
Henslow's Sparrow
Sharp-tailed Sparrow
* Vesper Sparrow SR
Lark Sparrow
Slate-coloured Junco M
Oregon Junco
Tree Sparrow WR
* Chipping Sparrow SR
Clay-coloured Sparrow
Field Sparrow
Harris' Sparrow
White-crowned Sparrow M
White-throated Sparrow M
Fox Sparrow M
Lincoln's Sparrow
Swamp Sparrow SR
* Song Sparrow SR
Lapland Longspur M
Snow Bunting

3. Upland Game

Ring-necked pheasants have been introduced into the North Grey Region many times. The area is not within the climatic range where they can be expected to thrive without an artificial supply of food in winter. Below the escarpment they have at times persisted near Thornbury and Meaford, but unless farmers or hunters are prepared to spend time and money in supplying food, no further attempts should be made to introduce them.

The Gray or European Partridge has also been introduced, as for example by Mr. Victor Bowes in 1936. A few have been reported at intervals near Workmans Creek in the area between Thornbury and Meaford; at least 20 were present in 1941 and they were known to be nesting in 1942. If a hardy strain of these birds was introduced they might build up to a fair population and supply a good annual yield. It is generally thought that the chief controlling factors in the success or failure of these birds in Southern Ontario are the incidence of freezing rain on a deep snow surface (where the birds have dived under the surface), and the June and July rainfall while the partridge chicks are young. Heavy rains may cause mud-balling and also pneumonia. It is therefore worth noting that the 30-year mean June rainfall in the North Grey Region as a whole is less than 2.8 inches and in part of the area is much lower. This would constitute a dry area compared with most of Southern Ontario. This area is one of the most promising in Southern Ontario for Hungarian partridges and the species should be given an extensive trial with sufficient numbers of birds to allow a build-up of the population. The Conservation Authority might carry this out in co-operation with the Department of Lands and Forests.

A few Bobwhites have been reported at intervals since 1940 both at Meaford and Thornbury. It is doubtful whether any were alive in 1957 and there appears to be no good reason to introduce them.

The European hare, which is not considered a useful animal by most farmers, has extended its range very rapidly since its introduction near Brantford in 1912, and occasionally becomes very common in the North Grey Region. In 1945 the "Skinner Hunt Club" walked over several one-thousand-acre blocks and their bag, on November 1, included 168 European hares. The population fell rapidly in 1946-47 and does not appear to have reached a peak similar to that of 1945 since that time. However, the hare is probably the commonest small game animal in the North Grey Region.

4. Small Mammal Trapping

The effects of small mammals, particularly of the Meadow Mouse (Microtus pennsylvanicus) can be extremely damaging to forest plantations. A few traplines were therefore set out in places where it was thought the Meadow Mouse might be common. These were all adjacent to or inside land classified as plantable land in the Forestry section of this report. Eleven separate traplines were used and traps were set for a total of 1,295 trap-nights.

In such areas it is usual to catch more of the Meadow Mouse than of any other species. The results in this area indicated that the Meadow Mouse was by no means common in the North Grey Region in 1957. The numbers of the various species caught were as follows:

SPECIES	TOTAL CATCH
Sorex cinereus (Cinereous Shrew)	13
Blarina brevicauda (Mole Shrew)	38
Peromyscus maniculatus (Deer Mouse)	50
Peromyscus leucopus (White-footed Mouse)	19
Microtus pennsylvanicus (Meadow Mouse)	4
Zapus hudsonius (Meadow Jumping Mouse)	16
Napeozapus insignis (Woodland Jumping Mouse)	3

While the Meadow Mouse population over the Region as a whole was obviously very low, it should be remembered that the biotic potential (or ability to multiply its numbers rapidly) is very high in the Meadow Mouse, and it is entirely possible for the numbers of mice to rise very quickly from one or two

remaining pairs, in the fall and early winter, to constitute a serious hazard to plantations. Plantations in which there is a good growth of grasses should therefore be closely watched for signs of mouse runways, and where these are found the mice should be removed by poisoned baits. Advice on this point can be acquired from the District Biologist of the Department of Lands and Forests or from the Field Officer of the Conservation Authority.

5. Amphibians and Reptiles

In the North Grey Region there are probably from twenty-five to thirty different species of amphibians and reptiles. Of these three or four are salamanders, at least six are frogs or toads, eight are turtles and about thirteen are different species of snakes. Many people have an unreasoning fear of frogs, toads and salamanders although they are harmless and useful to the gardener and farmer.

Four species of turtle, the snapping turtle, spotted turtle, Blanding's turtle and the painted turtle have already been reported in the area, which also probably contains the wood turtle, softshell turtle, map turtle and the musk turtle.

Ten kinds of snakes have been reported. It is not very likely that any rattlesnakes still occur in the Region. The last Massasauga rattlesnake, the only venomous snake ever reported, was seen on the lake shore east of Meaford in 1918*. The other species already reported† are as follows:-

Northern water snake
De Kay's snake
Red-bellied snake
Eastern ribbon snake
Eastern garter snake
Eastern hog-nosed snake
Eastern ring-necked snake
Eastern smooth green snake
Eastern milk snake

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* From the records of L. H. Beamer of Meaford.

† " " " " " " " "

Additional species which have been reported adjacent to the North Grey Region are the blue racer, the Eastern fox snake, and the black rat snake. None of the above thirteen snakes is venomous. Since man's fear of snakes has led to so many inaccurate statements and records, it should be added that neither copperheads nor water moccasins occur in Ontario at all, and that the common water snake, which is hostile to man when wild, when captured rapidly becomes docile and easy to handle. The writer is indebted to Mr. E.B.J. Logier, Associate Curator, Division of Ichthyology and Herpetology, Royal Ontario Museum of Zoology, for most of the foregoing information concerning turtles and snakes.

CHAPTER 4

IMPROVING THE LAND FOR WILDLIFE

The many varied types of land in the North Grey Region have already been mentioned. The requirements of food and cover vary greatly for different species of wildlife. Landowners also differ in what species of wildlife they wish to see on their land. Many wish to see some game species on their land, but do not wish to hunt them. During the 1957 survey no census of farmers' opinions on game or hunting was made but it is probably a safe assumption that more than fifty per cent of landowners are not interested in hunting or in increasing the number and kinds of game species on their property. There are of course many who are interested in the variety of wild birds seen. There appears to be a steadily growing interest in natural history in Ontario. The following remarks, therefore, apply to those whose lands include a part of the escarpment or the steeply sloping or swampy land in other parts of the watershed, and to all who wish to improve the carrying capacity of the land for wildlife.

1. Woodlands

The elimination of grazing on the 25 per cent of the land now in woodlots would be the most useful single measure in improving the wildlife environment. (The forestry survey of this region has already shown that 59 per cent of the remaining woodlands are now grazed).

In plantations, up to about the tenth year from planting, the entire planted area is valuable for wildlife. But large blocks of coniferous trees will, at least after about the twelfth year from planting, have little or no undergrowth and will, apart from their edges or fire-breaks in them, be relatively sterile as far as upland game and most forms of wildlife are concerned. The chief improvements to be expected will therefore come from good management of the farm woodlot. Selective cutting is both sound forestry practice and good

[illegible]

planning for wildlife. Landowners who have woodlots in which the crown canopy has closed over considerable areas and who wish to produce a proper environment for wildlife will find that release cuttings, slashings to stimulate sprout growth, thinnings and felling timber for sale, will improve rather than retard the carrying capacity for wildlife. Construction of brush piles from cuttings is recommended where cottontail rabbits are desired, two or three such brush piles per acre being the normal spacing.

2. Cultivation Practices

All good farming practices which make a more luxuriant vegetation will improve the farm environment for wildlife. A few special practices will give more specific benefits. Strip-cropping, described in the Land Use section of this report, is of particular value, since by this means no extensive area is denuded of cover at one time by harvesting. In the less flat parts of the agricultural section of the watershed filter strips, either above water diversion terraces or used as emergency waterways, provide travel lanes and nesting cover for wildlife. Cover crops such as the clovers and hairy vetch provide a habitat and food for wildlife in areas that would otherwise be barren during the winter months.

The elimination of brushy fencerows is now becoming more common in the North Grey Region. Those who are interested in wildlife improvement will find that the inclusion of a few field boundary hedges on the farm will moderate the effect of winds on crops, serve as travel lanes and cover for wildlife and harbour large numbers of songbirds which may help to control insect pests. Inevitably the presence of boundary hedges on a farm tends to encourage the growth of weeds. This is the price that must be paid for improved wildlife conditions. Rosa multiflora is an excellent hedge-forming shrub. It has a tendency, in Southern Ontario, to die back in winter but rapidly forms a dense hedge, which is reported to be proof

[illegible]

against cattle and hogs. It provides both cover and food and does not exhaust the nearby cultivated ground. The hardiness of some varieties is questionable. It might therefore be wise to propagate this species by vegetative means from individual plants that have already been planted and found to be hardy in the North Grey Region. It should be remembered that plants which are hardy in the lower and eastern part of the Region near Collingwood may not be hardy in the uplands farther south.*

The following are a few species of plants which are of particular value as food for wildlife. Those marked with a dagger (†) can usually be found growing on some part of every farm.

† Wild Grape - This plant provides excellent wildlife food and cover, but it forms such a dense tangle over fences and young trees that it should only be planted where it can be carefully watched and controlled.

Hairy Vetch - This plant can be grown on poor, sandy soil, and overwinters well. Cottontails and the European Hare use it for food and cover. The seeds are eaten by a great many of the ground-feeding birds.

European Millet - This plant fruits profusely and the seed attracts vast numbers of birds. It is grown commercially for bird seed.

† Elderberry - A great many species of birds feed on the small, black, juicy berries, and there are not often many of the fruits left in winter. However, the birds, once attracted, will return to feed on other fruits.

Corn - A few rows of uncut corn standing in a field or garden will provide excellent cover and a continual supply of food for the larger birds, including the Hungarian Partridge, if this species is introduced into the Region. Cracked corn is useful for smaller birds. Corn left near streams will almost certainly be removed and eaten by raccoons. At present there are probably no Hungarian Partridges in the watershed. The Authority might urge an experimental introduction of the species, when the present population in other areas of the Province reaches a high level.

Buckwheat - This common crop plant is chiefly grown for its abundant seed which is mixed in with other seeds in feed mixtures. The seeds have a high fat content, while the rest of the plant is commonly ploughed under, particularly to increase the soil nitrogen. Much of the seed drops off into the stubble, and buckwheat stubble is a favoured feeding ground for the Hungarian Partridge and many other birds.

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* The average frost-free periods for three representative locations follow: Durham 124 days, Meaford 148 days, Collingwood 153 days.

Highbush Cranberry - This shrub is strongly recommended, and grows as a native species in this area.

There are many other plants that could be recommended for use as cover, food or nesting sites in gardens. The best general reference book on this subject, for birds of this area, is "Planting Your Garden for Wild Birds", by James R. Mackintosh, published by the Audubon Society of Canada, 181 Jarvis Street, Toronto, Ontario.

3. Field Corners

Field corners are frequently barren of crops, and the ground cannot be ploughed to the corner. Therefore a fence crossing which embraces the corners of four fields may be made into a haven for ground-nesting species by planting a few trees and shrubs and protecting them. It is important to rid such areas of useless weeds by crowding them out with the normal climax type of open vegetation, such as Bluegrass, (Poa pratensis L.).

4. Ponds and Streams

The importance of water to wildlife is often forgotten. Many farms have at least one low spot where a small amount of work with a scoop will create a dam and a pond to provide nesting and feeding sites for water and marsh birds. If possible, ponds for wildlife should be separate from those intended for cattle or for fish. Willow cuttings, preferably shrub species rather than tree species, can be pushed in the ground around such a hollow, and will rapidly provide wildlife cover. New water areas are usually very rapidly invaded by aquatic plants, but additional species may have to be introduced. No extensive duck food studies have been made in Southern Ontario. Wild rice may be introduced, but since it is not well adapted to wide variations in water levels during its growing season, being often sterile in fluctuating waters, it cannot be considered as certain to succeed. The seed must be kept wet from the time it is harvested until it is sown

(or broadcast) on the water surface. The idea has long been current, and fostered by many sportsmen's organizations, that the growing of wild rice is the answer to the problem of how to attract ducks to any area. Wild rice is actually of little significance to ducks in Canada except in the fall, and does not provide good cover or nesting sites.

The following species, which may be easily obtained, are recommended as certain to be valuable duck foods. If none of them occur in ponds or shallows with good cover for ducks, they can be introduced. All of them are hardy in Southern Ontario.

Sago Pondweed	Potamogeton pectinatus L.
Red-Head Pondweed	Potamogeton Richardsonii (Ar. Benn.) Rydb.
Wild Millet	Echinochloa crusgalli (L) Beauv.
Japanese Millet	Echinochloa frumentacea (Roxb) Link
Wild Celery	Vallisneria americana Michx.
Knotweed	Polygonum pensylvanicum L.
Water-Smartweed	Polygonum coccineum Muhl.
Three-square	Scirpus americanus Pers.
Great Bulrush	Scirpus validus Vahl., var. creber Fern
Duckweed	Spirodela sp. and Lemna sp.

Those who are interested in farm ponds for wildlife will find very useful details of the various types of ponds and methods for constructing each type in a booklet, "Farm Ponds", which is available from the Provincial Department of Agriculture.* Farm ponds differ from those intended for wildlife in that care is usually taken to prevent the growth of aquatic vegetation in a farm pond intended only for watering stock or fire protection purposes. Otherwise, the construction and details of ponds for wildlife should follow one of the types there described.

Algae in ponds are often only present for a short time and will disappear in a month or so. A concentration of 0.5 p.p.m. of copper sulphate will destroy them temporarily at least. The larger aquatic vegetation, if too abundant,

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* Applications may be made to the nearest Provincial Agricultural Representative or to the Department of Agriculture, Parliament Buildings, Toronto.

cannot be removed except by cutting (a heavy chain is useful), by draining the pond or by the use of 2,4-D for emergent vegetation or poisonous compounds such as sodium arsenite for submerged plants. These compounds will of course kill fish also, and the use of this method requires permission from the Provincial Department of Lands and Forests and the Water Resources Commission of Ontario if the treated water flows into any other privately owned or public waters.

CHAPTER 5

FISH

1. Introduction

Stream surveys in the North Grey Region in 1957 were restricted to four kinds of work. These were as follows:

(a) A general classification of the waters defining the suitability of the various parts for different species of fish. Four lakes (Eugenia Lake, Mountain Lake, Sheppard Lake and Williams Lake) were not examined. The area of the Meaford Tank Range was also not examined.

(b) The main effluent pipes (sewage, storm drains and industrial wastes) entering the Sydenham River at Owen Sound were mapped.

(c) A general examination of Duncan Lake (Euphrasia Township) was made.

(d) Areas which appeared suitable for demonstrations of stream improvement were mapped.

2. Methods

The procedure adopted followed closely that used in previous surveys made by the Department of Planning and Development in other river systems. The streams were visited at 339 stations from half a mile to three miles apart on each stream course. The topography of the valley and the erosion, vegetation, volume of flow, turbidity, temperature and type of bottom were listed for each station. At all suitable stations collections of the aquatic insects and other invertebrates were made. At most of the stations collections of fish were also made. The collections were classified and used in zoning the various sections of the river, as shown on the accompanying maps.

Some of the mayflies, stoneflies and caddisflies were particularly useful since many are reliable indicators of the stream conditions at the time of year most critical for fish life. Some species are confined to waters which remain cold in summer. Others are indicators of permanent flow, of polluted water or of water with a high maximum water temperature. Thus the potentialities of a stream for particular species of

fish are indicated. The fish collections helped to substantiate these findings. An electrical shocker using a 230-volt, 2,500-watt generator was also used at a few places. However the collection of fingerling trout is not always an indication of suitable water for trout, as these may have been introduced into streams which later reach lethal temperatures. Seven maximum-minimum thermometers and four continuous recording thermometers were installed at various points in the waters between July 1 and September 11. Readings from the maximum-minimum thermometers were taken at least once in each week.

Many of the present criteria and methods were originally developed by Dr. F. P. Ide of the Department of Zoology, University of Toronto, whose work has been previously reported*. The analysis by J. C. Hallam† of previous river surveys made by the Department of Planning and Development was also found useful.

3. The Stream Courses

The general structure of the river valleys is described in the "Land Use" section of this report.

Most of the streams are greatly affected by the presence of the escarpment which may be a cliff or a series of cliffs, or cascades. There are also many others. Since brook trout and brown trout only move short distances, i.e., to

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* Ide, F.P., The Effect of Temperature on the Distribution of the Mayfly Fauna of a Stream. University of Toronto Studies, Biology 39, Ontario Fisheries Research Laboratory, Publication 50, 1935.

Ide, F.P., Quantitative Determination of the Insect Fauna of Rapid Water. University of Toronto Studies, Biology 47, Ontario Fisheries Research Laboratory, Publication 59, 1940.

Sprules, W.M., An Ecological Investigation of Stream Insects in Algonquin Park, Ontario. University of Toronto Studies, Biology 56, Ontario Fisheries Research Laboratory, Publication 69, 1947.

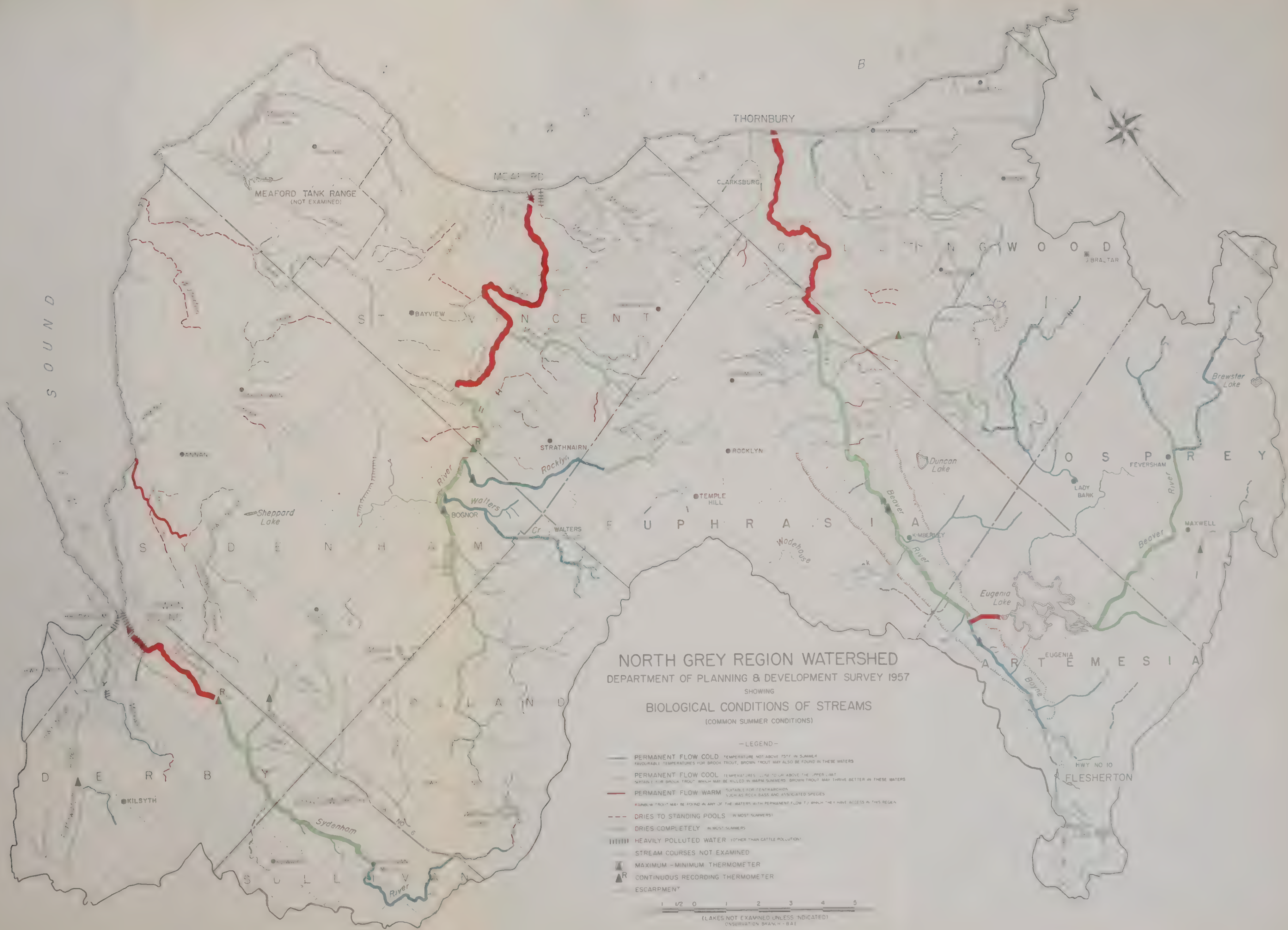
† Hallam, J.C., Habitat and Associated Fauna of Selected Species of Fish in Ontario Streams. M.A. Thesis, University of Toronto, 1954.

moving gravel beds for spawning or to larger pools and rapids for feed and cover they are little affected by these obstructions. The temperature of the water is the major controlling factor in the distribution of these fish. The chief cliff lines are shown on the accompanying map Biological Conditions of Streams. Rainbow trout, being migratory species, are blocked by dams near the mouths of the Beaver River and the Sydenham River. A few comments on the character of the most important streams for fish here follow.

The upper Beaver River flows through a sand plain and also through till moraine, but several small dams which make pools help to remove the fine silt and the stream is still, clear and cool where it enters Eugenia Lake. The Boyne, a tributary of the Beaver, starts in moraine land above Wilcox Lake, and passes down the escarpment in a series of cascades. The lower course of the Beaver lies chiefly in heavily wooded land, with a log jam at one point, and the stream passes slowly through a clay plain and then a sand plain. The lower part of the river is turbid, but above Kimberley the stream is clear and has a gravel bottom.

The upper part of the Bighead flows through till moraine but after falling with an even, steep gradient, to the drumlinized plain below, it receives two spectacular tributaries, Rocklyn Creek, which falls evenly about 100 feet per mile for six miles, and Walters Creek which falls 400 feet in four miles. The lower course of the Bighead meanders for twenty miles amongst drumlin hills on an even till plain, and has a low gradient.

The Sydenham (draining morainic hills) and the Pottawatomi (draining a limestone plain) both have relatively low gradients above the escarpment, but neither is a particularly sluggish stream, although both pass through scattered swamps. The escarpment drop is very pronounced with vertical falls in each river.



THORNBURY
MEAFORD TANK RANGE
(NOT EXAMINED)
CLARKSBURG
BAYVIEW
S T. V I N C E N T
C O L L I N G W O O D
GIBRALTAR
SOUND
STRATHNAIRN
Rocklyn
ROCKLYN
River
Walters
BOGNOR
Cr.
WALTERS
E U P H R A S I A
TEMPLE HILL
Wodehouse
Beaver
River
KIMBERLEY
Duncan Lake
LADY BANK
O S P R E Y
FEVERSHAM
Brewster Lake
MAXWELL
Eugenia Lake
EUGENIA
A R T E M E S I A
Boyne
HWY NO 10
FLESHERTON
ANNAN
Sheppard Lake
S Y D E N H A M
H O L L A N D
D E R B Y
KILSYTH
Sydenham
River
S U L L I V A N
NORTH GREY REGION WATERSHED
DEPARTMENT OF PLANNING & DEVELOPMENT SURVEY 1957
SHOWING
BIOLOGICAL CONDITIONS OF STREAMS
(COMMON SUMMER CONDITIONS)
—LEGEND—
PERMANENT FLOW COLD
PERMANENT FLOW COOL
PERMANENT FLOW WARM SUITABLE FOR CENTRARCHIDS SUCH AS ROCK BASS AND ASSOCIATED SPECIES
DRIES TO STANDING POOLS
DRIES COMPLETELY
HEAVILY POLLUTED WATER
STREAM COURSES NOT EXAMINED
MAXIMUM - MINIMUM THERMOMETER
CONTINUOUS RECORDING THERMOMETER
ESCARPMENT
1 1/2 0 1 2 3 4 5
(LAKES NOT EXAMINED UNLESS INDICATED)

GEORGIAN BAY
NOTTAWASAGA BAY
OWEN SOUND
HWY NO 26
HWY NO 6
HWY NO 6-10
HWY. NO. 10
HWY NO 21
MEAFORD
THORNBURY
CLARKSBURG
CAMPERDOWN
CRAIGLEITH
BANKS
COLENSO
MOUNTAIN LAKE
BALACLAVA
MORLEY
SILCOTE
GARRYOWEN
WOODFORD
BAYVIEW
OXMEAD
GRIERSVILLE
HEATHCOTE
VICTORIA CORNERS
GIBRALTAR
RAVENNA
REDWING
KOLAPORE
FAIRMOUNT
EPPING
ROCKLYN
DUNCAN
DUNCAN LAKE
ELMHEDGE
STRATHNAIRN
BLANTYRE
TEMPLE HILL
GORING
WALTERS FALLS
BOGNOR
ANNAN
LEITH
SHEPPARD LAKE
BOTHWELL CORNERS
BROOKHOLM
OWEN SOUND
HOATH HEAD
Mc GILL LAKE
MASSIE
INGLIS FALLS
CHATSWORTH
KILSYTH
KEWARD
SULLIVAN MILLS
WILLIAMS LAKE
BEAVERDALE
WODEHOUSE
KIMBERLEY
EUGENIA LAKE
EUGENIA
FLESHERTON
WILCOX LAKE
LADY BANK
FEVERSHAM
MAXWELL
BREWSTER LAKE
ST. VINCENT
SYDENHAM
EUPHRASIA
COLLINGWOOD
OSPREY
ARTEMESIA
HOLLAND
DERBY
SULLIVAN
BIOLOGICAL COLLECTION STATIONS
1957 SURVEY
DP&D CONSERVATION BRANCH-B A E
SCALE 1/2 0 1 2 3 MILES

The most important minor streams entering Lake Huron in the Region are Telfer Creek (Bothwell's Creek) which falls 300 feet in six miles and Indian Brook which has an even but very steep gradient (800 feet in seven miles). Most of the other minor streams dry up in summer.

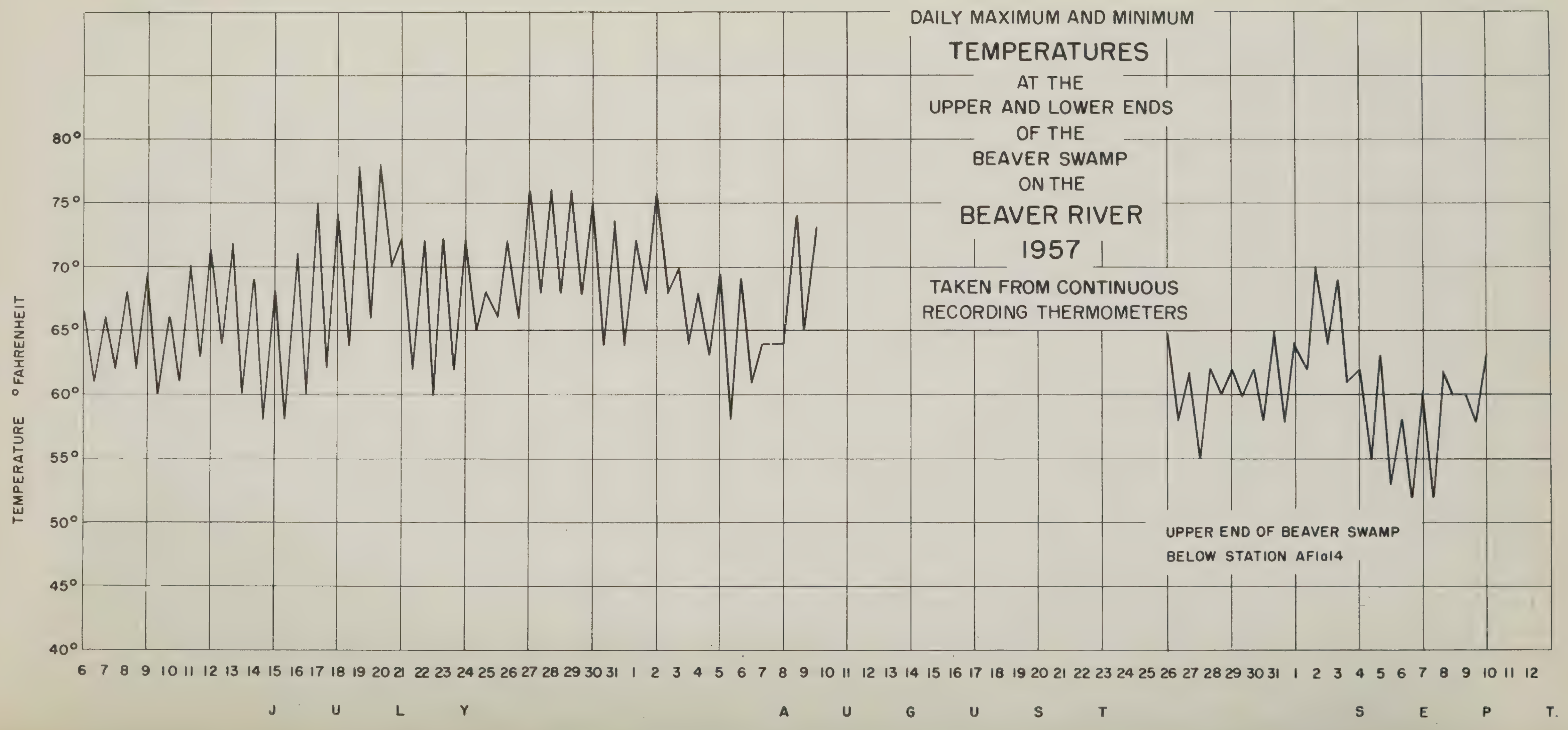
4. Permanence of Flow and Temperature Conditions

The permanence of flow of the various streams in the Region is shown on the accompanying map "Biological Conditions of Streams". The most significant condition to be seen on this map is the very high proportion of cool and cold water in summer and the low proportion of warm water.

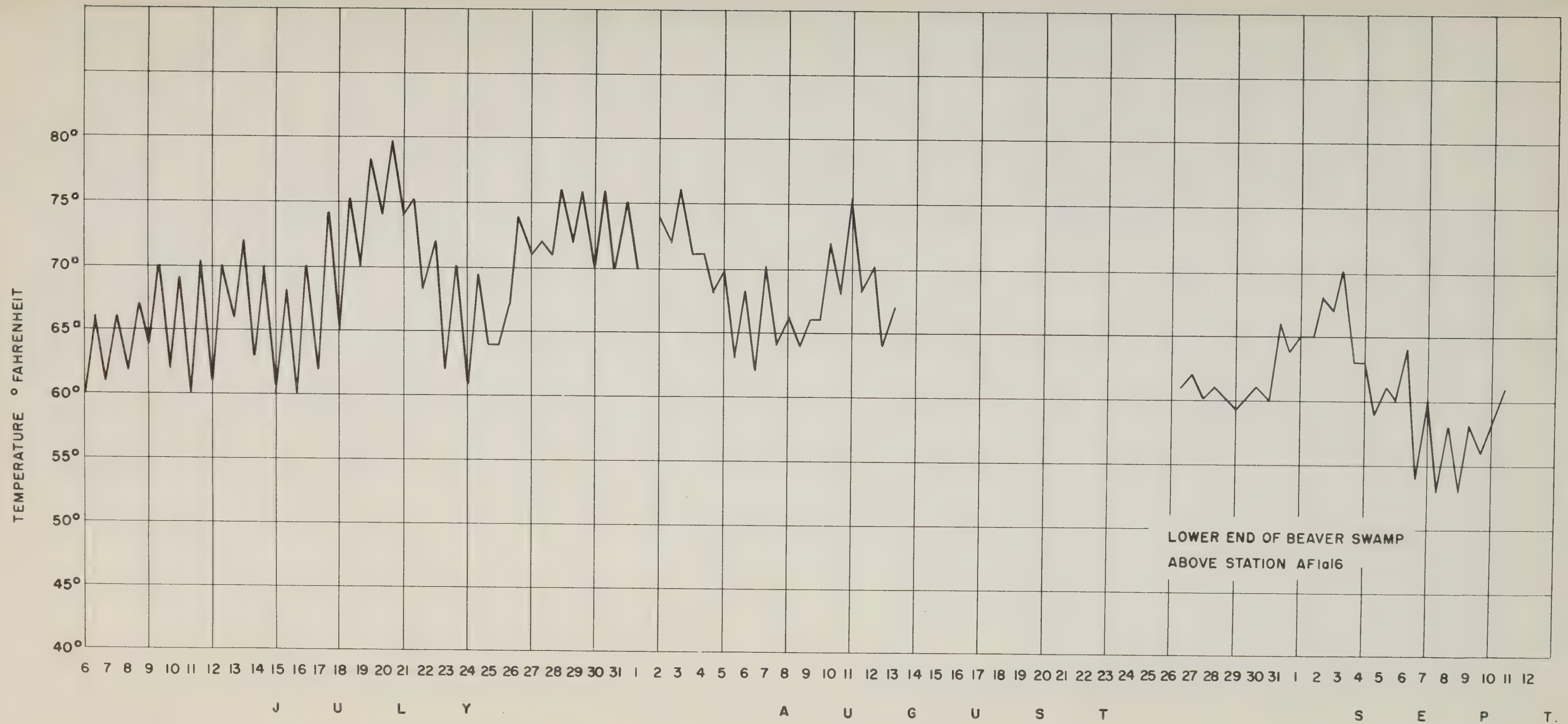
Of the 339 stream stations examined (those in the Meaford Tank Range were not seen) 72 had no flow when examined although many of them had standing pools.

Continuous recording thermometers were placed at the upper and lower ends of the beaver swamp on the Beaver River, and the records are shown on accompanying graphs. The records for 1957 suggest that the upper end of the stream in the swamp is favourable habitat for brook or brown trout and that the Beaver River at the lower end of the swamp is hardly suitable habitat for brook trout. Brown trout which are slightly more tolerant of water in the range 73°F to 80°F may thrive in the lower section of the swamp although none were caught there during the survey. The occurrence of rock bass at stations AF1a16 and AF1a17 suggests that the water is probably more favourable for smallmouth bass.

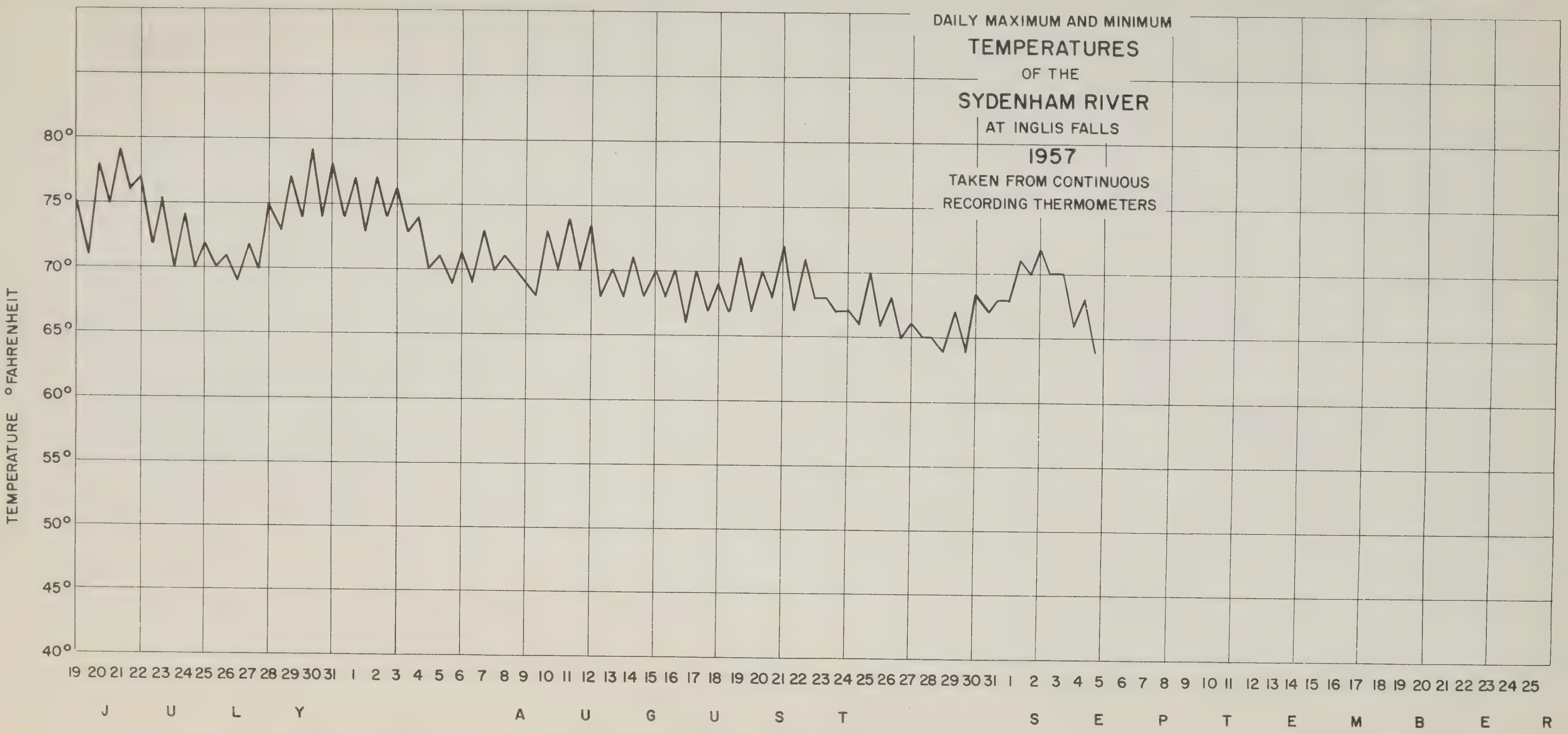
The Sydenham River at Inglis Falls appears to be favourable habitat for smallmouth bass, from the records of a third continuous recording thermometer. A fourth recording thermometer was installed in the Bighead River at station AJ1a9. From the temperature records shown this part of the river appears to be marginal territory for the smallmouth bass and rock bass which were found in it, and a high growth rate can hardly be expected.



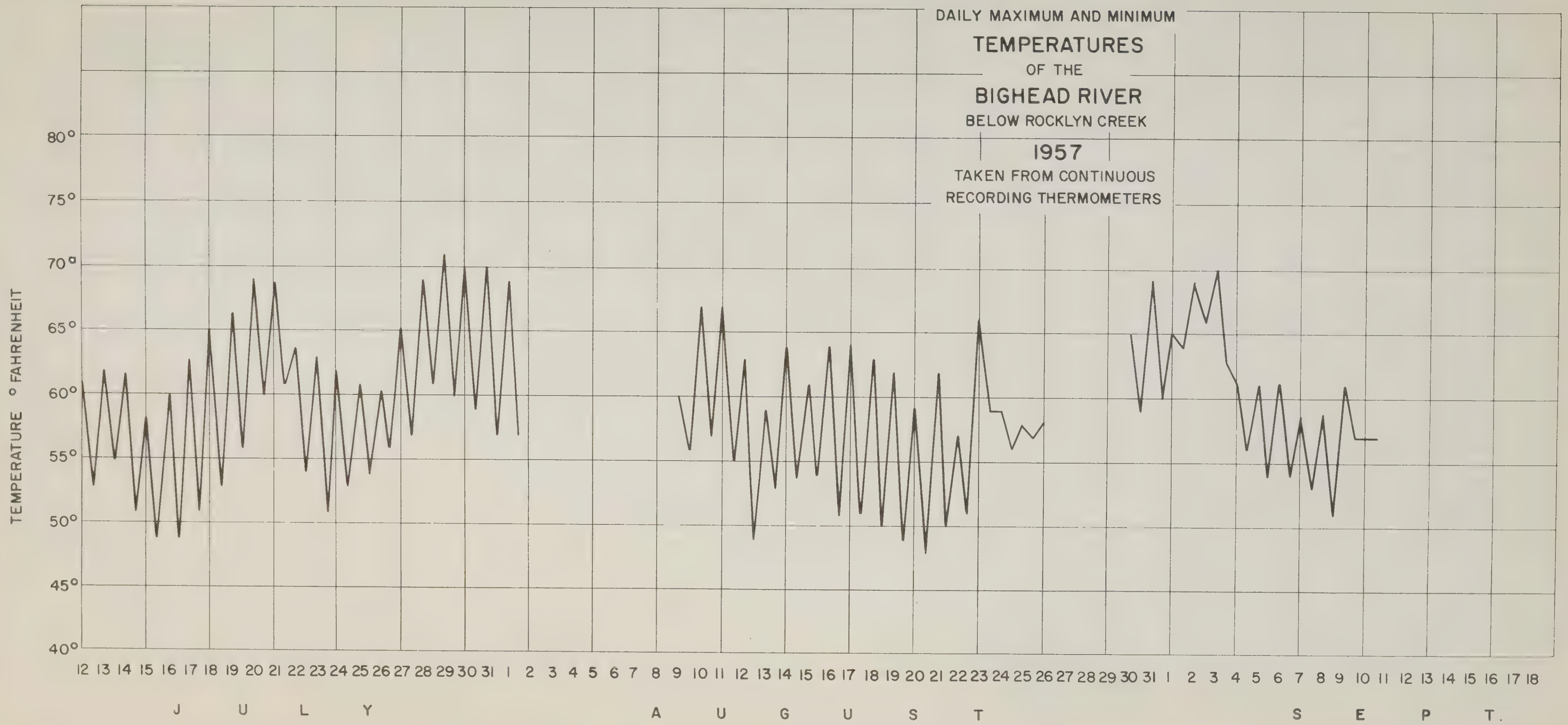
D.P. & D. CONSERVATION BRANCH S.L.B.



D.P.&D. CONSERVATION BRANCH S.L.B.



D.P.&D CONSERVATION BRANCH S.L.B.



D.P.&D. CONSERVATION BRANCH S.L.B

5. Fish Distribution

LIST OF FISHES OF THE NORTH GREY REGION

(Based on the 1957 surveys)

In the following list of fishes, the order and terminology are taken from "A Checklist of the Freshwater Fishes of Canada and Alaska" by W. B. Scott, Ph.D, Curator of Herpetology and Ichthyology, Royal Ontario Museum, Toronto, 1958.

		No. of Stations at which the Species was collected in the 1957 Survey
Petromyzonidae -	lampreys	
Brook or silver lamprey (Ichthyomyzon sps.)		†
Sea lamprey		†
Salmonidae -	salmons and trouts	
Brown trout		13
Rainbow trout		21
Brook trout		77
Esocidae -	pikes	
Northern pike		1
Umbridae -	mudminnows	
Central mudminnow		30
Catostomidae -	suckers	
White sucker		66
Cyprinidae -	minnows	
Golden Shiner		1
Creek chub		131
Pearl dace		46
Redbelly dace		47
Finescale dace		20
Lake chub		3
Blacknose dace		110
Longnose dace		46
Rosyface shiner		1
Common shiner		47
Blacknose shiner		2

* Species which may be familiar to the angler are starred.

† Lampreys collected by Fisheries Research Board of Canada 1956, 1957, 1958.

			No. of Stations at which the Species was collected in the 1957 Survey
Cyprinidae (continued)		mudminnows	
Brassy minnow			7
Bluntnose minnow			15
Fathead minnow			4
Gadidae	-	cods	
* Burbot		(collected in 1958)	1
Centrarchidae	-	sunfishes	
* Smallmouth bass			10
* Rock bass			10
Percidae	-	perches	
Yellow perch			1
Logperch			2
Johnny darter			24
Iowa darter			4
Cottidae	-	sculpins	
Mottled sculpin			34
Slimy sculpin			10
Gasterosteidae	-	sticklebacks	
Brook stickleback			87

(* Species which may be familiar to the angler are starred.)

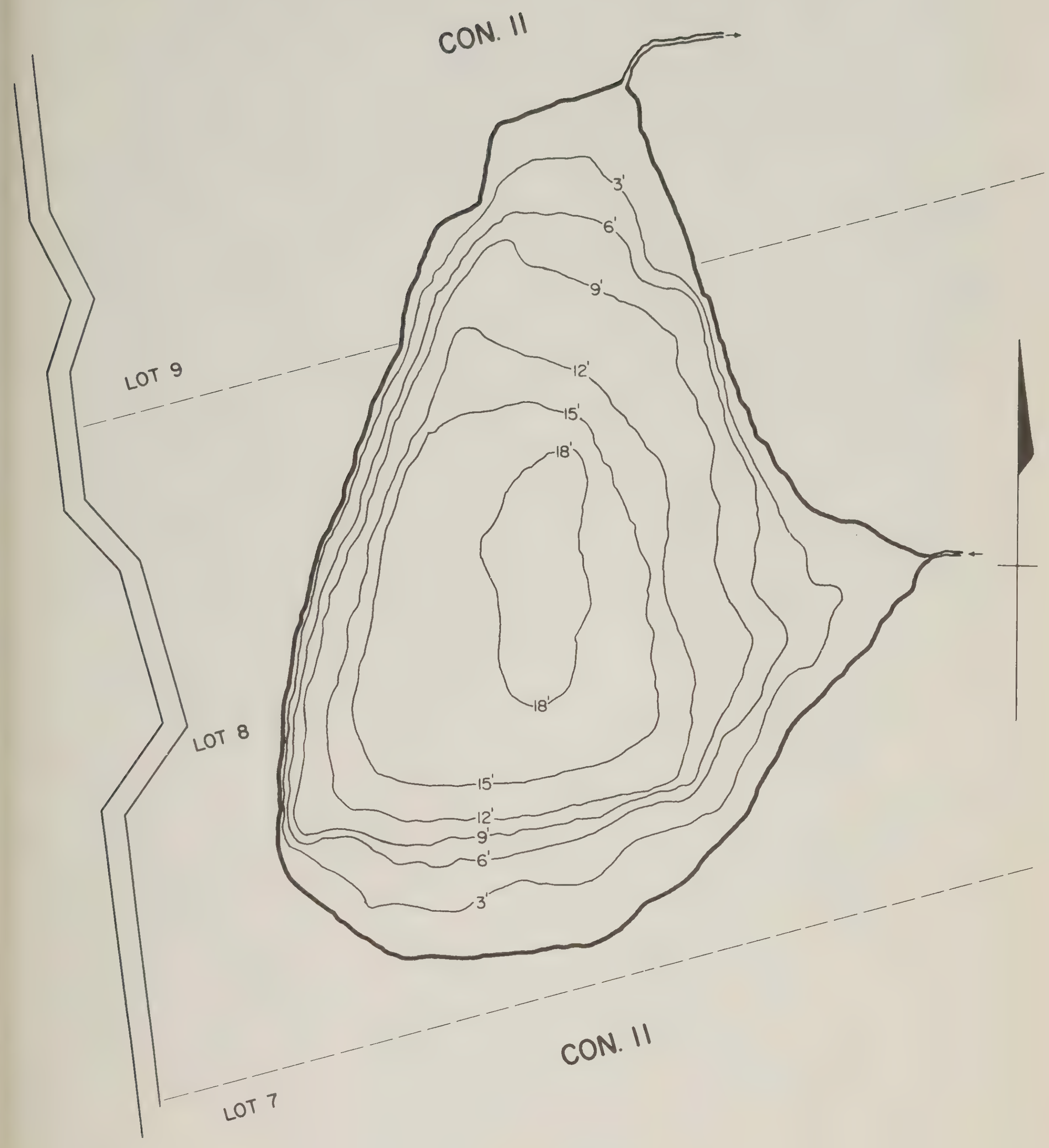
This list, of course, does not include all those species which would probably be found in the rivers of the Region with more extensive sampling, particularly in the late spring months. It is very probable that at least the following additional species would be found:-

Alewife
American smelt (particularly in the spring months)
Northern redhorse
Carp
Brown bullhead

The following comments summarize the distribution of fish, so far as the 1957 collections are concerned. The stations at which game fish were collected are noted on the accompanying map "Game Fish and some Associated Species". It must be repeated that the Meaford Tank Range was not examined, but it is well known that Mountain Lake, within the Tank Range,

DUNCAN LAKE DEPTH CONTOURS

EUPHRASIA TOWNSHIP



DATE: AUGUST 10, 1957

TEMPERATURE: 71° F. AT ALL DEPTHS

FISH TAKEN: MICROPTERUS DOLOMIEUI - SMALL MOUTH BASS
SEMOTILUS ATROMACULATUS - CREEK CHUB*
HYBORHYNCHUS NOTATUS - BLUNTNOSE MINNOW
AMBLOPLITES RUPESTRIS - ROCK BASS*
*FOUND IN VERY SMALL NUMBERS

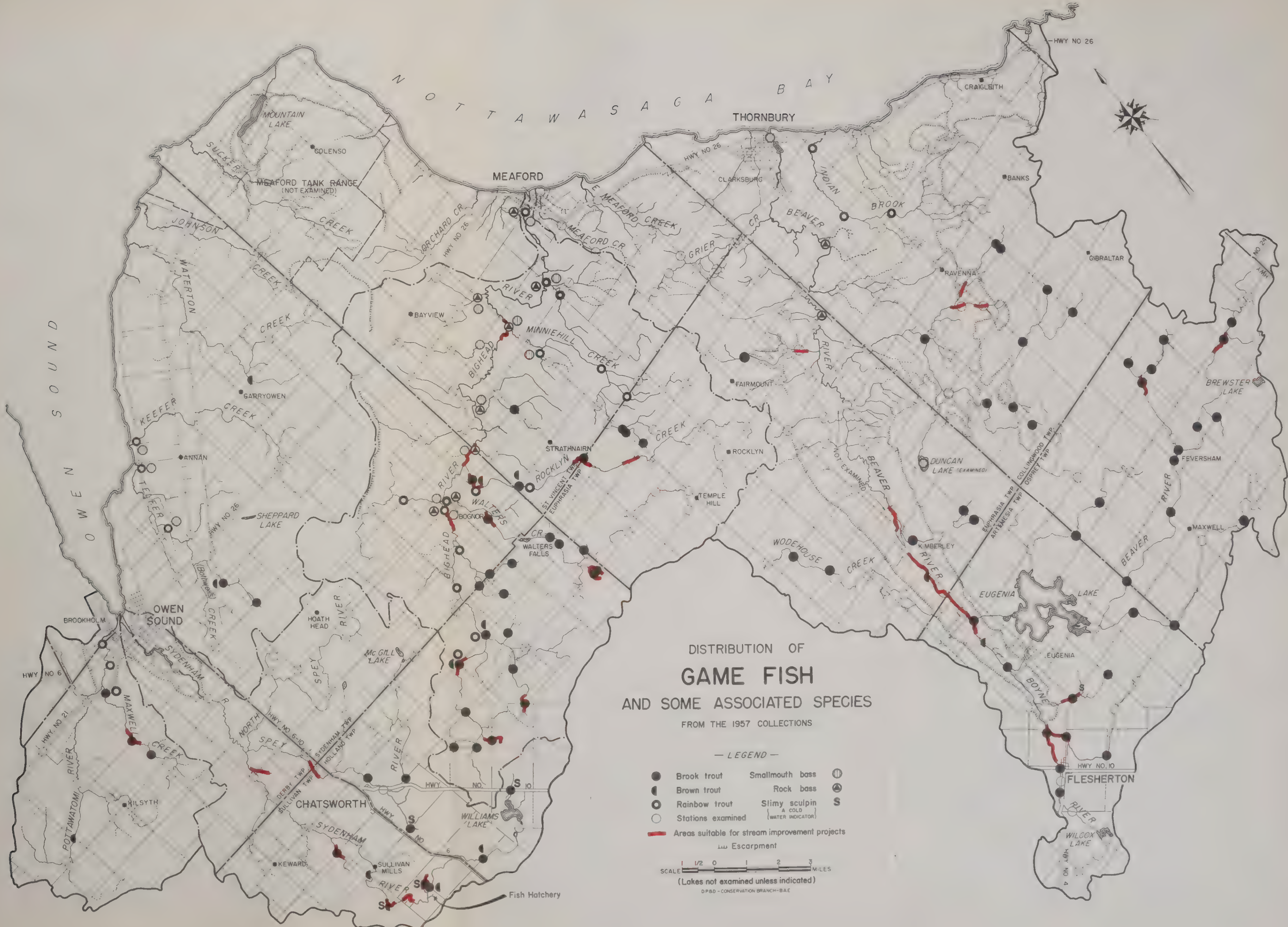
TURBIDITY: 5-6 FT. SECCHI DISK READING

AIR TEMPERATURE: 80° F.

SCALE · FEET

0 125 250 500 750 1000

D.P.&D. CONSERVATION BRANCH E.E.M.


DISTRIBUTION OF
GAME FISH
AND SOME ASSOCIATED SPECIES
FROM THE 1957 COLLECTIONS
— LEGEND —
Brook trout
Brown trout
Rainbow trout
Stations examined
Smallmouth bass
Rock bass
Slimy sculpin (A COLD WATER INDICATOR)
Areas suitable for stream improvement projects
Escarpment
SCALE 1 1/2 0 1 2 3 MILES
(Lakes not examined unless indicated)
DPBD - CONSERVATION BRANCH - B.A.E.
NOTTAWASAGA BAY
OWEN SOUND
THORNBURY
MEAFORD
OWEN SOUND
CHATSWORTH
FLESHERTON
CRAIGLEITH
BANKS
CLARKSBURG
GIBRALTAR
RAVENNA
FAIRMOUNT
ROCKLYN
STRATHNAIRN
TEMPLE HILL
KIMBERLEY
FEVERSHAM
MAXWELL
EUGENIA
WALTERS FALLS
BOGNOR
BAYVIEW
GARRYOWEN
ANNAN
COLENSO
BROOKHOLM
HOATH HEAD
HILSYTH
KEWARD
SULLIVAN MILLS
MEAFORD TANK RANGE (NOT EXAMINED)
MOUNTAIN LAKE
SHEPPARD LAKE
McGILL LAKE
WILLIAMS LAKE
DUNCAN LAKE (EXAMINED)
EUGENIA LAKE
BREWSTER LAKE
WILCOX LAKE
SUCKER CREEK
JOHNSON CREEK
WATERTON CREEK
KEEFER CREEK
TELFER
BOTHWELL'S CREEK
SYDENHAM R
NORTH SPEY
SPEY RIVER
MAXWELL CREEK
POTTAWATOMI RIVER
ORCHARD CR
BIGHEAD RIVER
MINNIEHILL CREEK
E. MEAFORD CREEK
MEAFORD CR
GRIER CR
INDIAN BROOK
BEAVER RIVER
ROCKLYN CREEK
WALTERS CR
WODEHOUSE CREEK
BOYNE RIVER
NOT EXAMINED
HWY NO 26
HWY NO 6
HWY NO 21
HWY NO 6-10
HWY NO 10
HWY NO 4
HWY NO 24
ST VINCENT TWP
EUPHRASIA TWP
COLLINGWOOD TWP
OSPREY TWP
ARTEMESIA TWP
SYDENHAM TWP
HOLLAND TWP
DERBY TWP
SULLIVAN TWP
Fish Hatchery

has a good population of brook trout. Brook trout are of course by far the most widely distributed game fish in the Region. Rainbow trout fingerlings were very common in the main stream of the Bighead and also in Rocklyn Creek and Minniehill Creek. They are at present blocked from access to the Beaver and Sydenham Rivers (although they have been planted above the Owen Sound dam on the Sydenham River), and the section of the Pottawatomi River available to them does not appear to have suitable spawning grounds. There were also many adult rainbow trout in May 1958 in sections of Rocklyn Creek where they had been trapped by the lack of heavy flow in the winter and spring. Brown trout have been introduced into a few streams, particularly the Sydenham River, the Pottawatomi River and the lower part of the Bighead River, near Minniehill Creek. In an average year from 8,000 to 10,000 brown trout are planted in the streams of the watershed and from 20,000 to 25,000 brook trout, apart from the large plantings of brook trout in Eugenia Lake.

Young sea lampreys (ammocoetes) were found to be common in Silver Creek (stations AD1a1 to AD1a4 on the accompanying stream station map). Five hundred and sixty-one were collected in 1957 and 927 in 1958 during surveys conducted by the Fisheries Research Board of Canada. The American brook lamprey (a non-parasitic species) was also found in Silver Creek, the Beaver River, Telfer Creek and in the Sydenham during the same surveys.

Smallmouth bass were found only in the Bighead River (from Bognor to Meaford) and in Telfer (Bothwell's) Creek, apart from Duncan Lake where they are abundant. There are also considerable stretches of water suitable for smallmouth bass in the lower Beaver River and they may be present here and in a few other streams.

The commonest fish in the Region appeared to be the creek chub. Most of the other fish collected were small darters (of the perch family) and numerous species of minnows of little importance to the angler.

6. Pollution

The steep gradient of most of the streams makes them relatively free from cattle pollution. Pollution from other sources than cattle was most noticeable in the lower part of the Pottawatomi and Sydenham Rivers and in the Bighead River and Meaford Creek at Meaford. The severe pollution at Owen Sound (as observed in this Biological Survey) is well known. There was also pollution in a tributary of the Bighead near Elmhedge in St. Vincent Township, at stations AJlm3 and Ajlm4. Pollution from sawdust was present at several sawmills. The dumping of sawdust in streams is illegal.

It is recommended that the Conservation Authority establish a Committee on Pollution. If the water is used for swimming or for human use, samples may be taken in sterile bottles which are provided free by the Provincial Government. These samples can be sent for examination to the Water Resources Commission's offices in Toronto or to its district offices, so that the present Acts controlling pollution may be enforced. Pollution involving the life or health of fish should be also reported to the local Conservation Officer of the Department of Lands and Forests or to the district office in Owen Sound.

7. Stream Improvement

With a few exceptions, improvement of the streams so that they would eventually support more fish could be carried out almost anywhere on the permanent stream courses in the North Grey Region. The chief exceptions are the streams falling over the escarpment or cascading down it, and the sluggish sections lower down on the larger streams such as the Beaver, Bighead and Sydenham. In the latter areas erosion of the banks is the chief defect.

A number of sections of stream which could be easily improved, either as a demonstration by the Conservation Authority or by private owners, are shown on the accompanying map "Game Fish". Improvements cannot be expected to show any

An easily constructed stile here gives access to a stream where there is an agreement between a farmer and a fishing club whereby the stream is protected from erosion by cattle.

Where it is necessary to water at a stream, stones (or preferably gravel) can be used to reduce silting.

Here a farmer has taken the initiative in placing a rip-rap of stones to prevent bank erosion. The photograph was taken near Elmhedge, in St. Vincent Township.

results for a year or more since time is required for the deepening of streams and their stabilization in that condition. Many of the streams have suffered from having been cleared of all logs and debris when the practice of log-driving was carried on.

Some of the types of stream improvement structures which improve the environment for fish are shown in the accompanying photographs. These include:-

(a) Deflectors - These narrow the stream and force the current to dig deep holes. These may be left plain or made to support a turf covering. Deflectors must be very well anchored at both ends, and inset into the bank.

(b) Digger logs - with or without V Dams - These are commonly placed at right angles to the stream and at or just below the surface. Their chief effect in forcing the water to scour the bottom naturally takes place during floods.

(c) Log-cribs - These supply additional cover and if placed in fast water usually have a hole downstream from them.

All of the photographs illustrating these kinds of stream improvement were taken in the North Grey Region on the Sydenham River between stations AT1a4 and AT1a5. The work was carried out with the advice of Mr. K. Juck, of the Department of Lands and Forests.

It is rapidly becoming difficult to find areas which offer good fishing and which are also available to the general public. One possible remedy for this situation is that the Conservation Authority might make an agreement with a landowner or a group of landowners to allow public fishing in return for some service rendered. Alternatively a conservation Authority might acquire an area for various conservation purposes, called a Conservation Area (as an official scheme under The Conservation Authorities Act) and might manage the fishing and improve the streams for fishing, within the area. The Rocklyn Creek Conservation Area is particularly suitable for this form of development. This area has good populations

In this section of the Sydenham River a digger log has caused the stream to carve a hole five feet deep, which provides excellent trout cover.

A log crib built into a stream and planted with aquatic vegetation here provides good additional fish cover.

A deflector covered with turf and an anchored stump here increase the depth and rate of flow in the Sydenham River.

of brook and brown trout and also large numbers of young rainbow trout and a few adult rainbow trout can usually be caught in spring and in the fall. The upper sections of the Bighead River, above its junction with Walters Creek, also contain all three species of trout, and include alternative sections which might be embodied in a Conservation Area. This would be in the section of the river above and below station Ajla6 on the accompanying station map.

It is perhaps worth noting that many governments, for example that of New York State, have long ago acquired, and still maintain, stretches of first-class trout streams in agricultural as well as other land, so that they will not be lost to the general public.

8. Fish Ladders

If fish ladders were installed either on the Sydenham River or on the dams near Thornbury, the Sydenham and Beaver Rivers would undoubtedly be used by rainbow trout. This action would provide a long section of good spawning bottom for rainbow trout in the Beaver River and its small tributaries and possibly a short section in the Sydenham River. The opening of these rivers to rainbow trout would also open the rivers to the sea lamprey. This possibility has been carefully examined and it is the considered opinion of lake fisheries specialists who were consulted that the total effect of additional lamprey spawning areas in these rivers would be negligible and that when lamprey control is achieved lampreys can easily be controlled in these streams. They might in fact provide useful experimental data on lamprey growth and populations.

9. Farm Fish Ponds

There is ample room for improvement of this type of fishing. The chief research on management of farm fish ponds has been carried on in southern and warmer climates, and therefore the findings cannot be applied without qualification

to an area having the climate of Southern Ontario, but some definite recommendations may be made. Suitable methods for the construction of farm ponds are given in a bulletin, "Farm Ponds", which may be obtained from the Ontario Department of Agriculture.

From the fisherman's point of view, farm ponds are of two main kinds:

(a) <u>Trout Ponds</u>

The first is the cool pond with continuous inflowing water and maximum temperatures at the surface of about 75° Fahrenheit with cooler bottom. Ponds of this type are adapted to the production of speckled or brown trout. They are usually placed near the headwaters and may range in size from about an acre to 8 or 10 acres. Depth should be 10 feet or more in the deepest part. Spring flow of as low as half a cubic foot per second will maintain a pond of one acre.

The outlet of each dam should be a pipe (with a screened inlet at the bottom of the pond) rising close to the normal surface level and there passing through the dam, so that cold water is drained from the bottom and the warmed surface water is not allowed to flow over the dam. The surface water in the pond serves as an insulating layer, and the water below the pond has scarcely been heated by its passage through the pond. The pipe should be of such a size as to discharge the minimum summer flow. In time of flood the additional flow would pour over the dam at a suitable outlet, or be carried around it by a grassed spillway.

The by-pass type of pond has two particular advantages for the production of either speckled or brown trout. A pond of this class is built close to but not on a permanent stream and gets its name from the fact that the water supply is by-passed through a pipe from the stream to the pond. The first advantage is that there is no danger of the pond filling up with silt, because any excessive run-off goes down the permanent stream channel and not through the pond. The other

advantage is that by controlling the amount of cold water entering the pond the temperature of the pond may be adjusted to give the maximum growth rate in the fish kept there.

However, trout ponds do not normally have spawning beds for trout and, therefore, must be managed on a put-and-take basis, i.e., stocked artificially.

(b) Warm-Water Ponds

The second and commoner type of farm pond is the warm-water pond. Most farms have at least one low spot suitable for a fish pond. It is frequently good practice to have separate ponds devoted to wildlife and fish and to control the aquatic plants in the fish pond.

In managing warm-water ponds for fish the following points should be kept in mind.

(1) A minimum depth of 12 feet over at least 25 per cent of the pond should be planned to avoid excessive winter kill, probably the critical factor in fish survival in farm ponds in Ontario.

(2) If suckers, carp or large numbers of minnows are already present in the pond, it is usually best to destroy all fish in the pond before stocking.

(3) It is often necessary to control existing aquatic vegetation. There are both mechanical and chemical methods available.*

(4) Since many of the species commonly recommended for introduction grow very slowly in Ontario waters, research to determine the most satisfactory species will be needed. New ponds and those in which the previous fish have been destroyed might be stocked experimentally with a combination of largemouth bass (Micropterus salmoides) and one of the forage fish species.

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* Speirs, J. Murray. Summary of Literature on Aquatic Weed control. Canadian Fish Culturist, 3:(4); August 1948. (Many other chemical compounds have been developed for this purpose since the publication of the above summary).

The most suitable forage fish for farm ponds in the North Grey Region would probably be the fathead minnow (Pimephales promelas), which is very common in the watershed. It was collected at 61 collection stations on the river, and does well in ponds.

If it is found necessary to control the numbers of young largemouth bass, a pure race of the bluegill might be used instead of the minnows, but these would probably have to be imported from the United States, as those found here commonly include hybrids with the pumpkinseed. Those importing fish should have the arrangement approved by the provincial Department of Lands and Forests.

The fertilizing of ponds for the increased growth of plankton (the smaller aquatic invertebrates) to provide food for fish, should be approached with caution. Those considering fertilizing ponds should apply to the local District Biologist at Hespeler for advice.

NORTH GREY REGION CONSERVATION REPORT

RECREATION

ONTARIO DEPARTMENT OF PLANNING AND DEVELOPMENT

CONSERVATION BRANCH

CHAPTER 1

RECREATIONAL PLANNING AND THE NORTH GREY REGION

Ontario is Canada's most populous province. In 1956 contained 5.4 million people, or 33.6 per cent of the national pulation. Although its population is not increasing as rapidly as did in the first quarter of this century, it is still one of the stest-growing provinces of the country. Between 1951-56 its popution increased by 17 per cent, and if this rate persists the provce should double its population in another thirty years. This inease is mainly in urban areas. "Since the turn of the century tario has changed from a society with a majority of rural dwellers 7 per cent of the total in 1901) to a heavily urbanized one"* In 56 the urban population constituted 76 per cent of the total. The end to urbanization and the urban intensity are most pronounced the York, Peel, Halton, Brant and Wentworth counties, which front the western shore of Lake Ontario. These contain 37 per cent of province's population, 94.1 per cent of which is urban. Most this population is concentrated in the great conurbation formed Toronto, Hamilton and adjacent towns and settlements.

Greater mobility, shorter work week, longer holidays, higher wages, are bringing more recreation time within the reach more and more people. Recreation has now become both a habit and eed of the urban folk and the tourist industry already plays an ortant part in the economy of the country and many of its parts. sidering all these factors, it is obvious that provision should be e for greater recreational facilities not only in the interest of people but even in the interest of local economies. The need is ticularly urgent in the case of public recreation, and it is imtant that many of the areas of recreational potential which are ll available and accessible should be reserved for public use.

Economic Survey of Ontario 1956, p. B49.

CHAPTER 2

LOCATION AND SPECIAL FEATURES

The North Grey Region comprises that part of the prov-
ce of Ontario which drains into Georgian Bay in a section which
tends from Black Bass Bay (5 miles from Collingwood) in the east,
Owen Sound in the west. The Region exhibits a number of special
atures.

It lies on Georgian Bay which is the only large body
the Great Lakes' waters lying entirely in Canada, and fronts on
at portion of the Bay which lies closest to the urban centres of
uthern Ontario.

The Region itself is a composite watershed of twenty-
ve different streams of which four are classed as rivers, nine as
dium-sized creeks, and twelve as creeks too small to have their
mes mentioned on even large-scale maps.

From west to east, and in order of increasing size,
e four rivers are the Pottawatomi, the Sydenham, the Bighead and
e Beaver. Their watersheds are contiguous and collectively
cupy more than two-thirds of the total area of the Region. The
lk of the territory in these watersheds has an interior location.
e only parts where the watersheds reach the lakeshore are the
rrow corridors formed by the neck and the mouth of the parent
ream. These corridors are occupied by major settlements. From
st to east, but in order of decreasing size, these settlements
e - Owen Sound (on the Pottawatomi and the Sydenham), Meaford (on
e Bighead) and Thornbury (on the Beaver). There is little doubt
at the advantages offered by the river-mouth location initiated
ese settlements, but their subsequent growth has depended more
n the advantages offered by the lake and lakeshore routes rather
n the rivers.

Ninety-eight per cent of the shoreline, however, lies
the twenty-one watersheds of the small creeks. From west to
t, the larger of the creeks are, Telfer, Keefer, Waterton, John-
, Sucker, Orchard, Meaford, East Meaford, Indian Brook, and at

least twelve other small creeks which lie in between. Unlike the interior watersheds of the large rivers, which are contiguous, the shoreline watersheds are separated by the narrow drainage corridors of the Bighead and the Beaver into three distinct sections.

Although the shoreline watersheds occupy less than a third of the total area of the Region, they contain almost all the area which is well-known and well-developed for recreation. On the other hand, the interior watersheds which possess as great, if not greater, recreational potential are neither well-known nor well-developed. This is mainly because they are by-passed by the major highways that serve the Region.

CHAPTER 3

THE NATURE OF THE REGION

The outdoor recreational potential of any given area epends largely on the nature and the attractiveness of its physical eatures. These in turn are determined by the area's topography, limate, forest cover and wildlife.

. The Topographic Features of the Region

The North Grey Region has a great variety of landorms differing from each other in recreational value. For the urposes of this study a discussion of each of the types is unnecesary. Hence reference is made only to those features which have istinct, even compelling, recreational value.

(a) The Niagara Escarpment

The Niagara escarpment forms the arch motif of the egion, and all other features, excepting the shoreline, are either ssociated with it or eclipsed by it. The escarpment enters the egion from the east, just south of Craigleith. Nowhere else in ntario is the escarpment either as close to the lake waters or as ountainous in aspect. From Craigleith the foot of the escarpment s little more than a mile, and just west of Delphi Point it is ittle more than 1,000 feet from Georgian Bay. The slopes are eavily wooded, steep and spectacular, rising 800 feet over a slope ich is only half a mile wide. The narrow corridor of lowland beeen the lake and the escarpment is traversed by Highway No. 26, ich in this part runs between pastures on the south and lakeshore chards in the north.

Atop, but behind the mountain, lies an upland basin at elevation of 1,400 feet. It is rimmed by rock slopes and covered beautiful woods. The local name for the basin is Deer Park, which dicates that in the past it had considerable wild life. This is t true of the present.

West of Deer Park, the escarpment turns southwards. is deeply notched by the Beaver Valley whose steep sides expose

he magnificent limestone cliffs of the escarpment in a number of laces. It re-appears again west of the valley at Griersville where he sheer face of the rock lies within five miles of Georgian Bay. est of Griersville, the escarpment becomes inconspicuous. Here he Bighead River and its tributaries make a series of notches, and heir combined basin is topped by numerous hummocky hills (or drumins) which cover the valley and the escarpment alike. The only lace where the escarpment asserts itself is near Walters Falls, here Walters Creek, a tributary of the Bighead, drops 150 feet over he face of the escarpment in a series of stairs. The falling water s here utilized by a sawmill.

The brow of the escarpment is not exposed again until t reaches the western edge of the Bighead Watershed. Here it exends in a north-easterly orientation until it reaches Cape Rich. he face of the escarpment, in the hump of land lying in the northrn sections of Sydenham and St. Vincent Townships, lies within a ile of the shoreline. In the north it is spectacularly shown, irst by the Clay Banks between Rich Point and Vail Point, and arther inland by the steep, rocky and heavily wooded banks of ountain Lake. The entire bend of the escarpment in this part has cenic and recreational values which cannot be utilized by the ublic, because the land belongs to the Federal Defence Department, nd is used for artillery practice. The area is known as the eaford Tank Range.

On the western side of the hump, the escarpment slope s definite but not spectacular, although in the area of Coffin Hill, here is a drop of 150 feet, followed by another 100-foot drop near e shoreline. The entire area within the hump is drained by small reeks which fan out from the middle.

The escarpment finally re-appears north of the city of wen Sound with a precipitous drop of 100 feet. It is to avoid this rop that the Canadian Pacific Railway line makes the big northward end to enter the city of Owen Sound.

In the vicinity of Owen Sound City, the deep north-south notch in the escarpment occupied by the Sydenham River, duplicates on a small scale the deeper and longer notch of the Beaver Valley. One finds a similarly-shaped profile with precipitous limestone cliffs and wooded river flats and slopes. There is, however, one difference. The Beaver Valley is long enough to approach the brow of the escarpment gradually. On the contrary, the smaller Sydenham tumbles down over the face of the escarpment in a series of steps producing a 115-foot drop at Inglis Falls, very similar to that of Walters Falls. The western bank of the escarpment is rocky in the south, but an old natural cut northwards permits easy cutting by the Pottawatomi and Maxwell Creeks on the northern boundary of the Region.

(b) The Beaver Valley

The Beaver Valley forms a large notch in the Niagara carpment and was occupied and deepened prior to glaciation by a ger river.

The Boyne is a small stream which originates near sherton and flows for only four miles before entering the head of notch in the escarpment. It flows for another four miles before joins the Beaver River. The upper reaches of the Beaver lie in the h upland occupied by the southern part of Collingwood and the thern part of Osprey Townships. This part accounts for 100 out of 225 square miles of the Beaver Watershed. The Beaver and its two n branches in this part flow across an area only thinly covered by cial till. The bedrock lies just below the surface, and river nnels are usually shallow and clear. Near Feversham the central nch of the Beaver cuts a gorge 100 feet deep through the overlying ft and westerly sloping bedrock. The cut is most pronounced be-en Feversham and a point about a mile north-west of Maxwell. The pes are heavily wooded; the waters of the river are slow running and ar; the bed is gravelly.

Eight miles farther downstream, the valley has been led with water, owing to the damming of the Beaver River just before descends from the brow of the escarpment. This is Eugenia Lake,

ch lies at an altitude of 1,400 feet, and occupies 1,430 acres. flow of the Beaver River is regulated by the dam, and only cified waters flow through the natural cut made by the Beaver in eastern wall of the glacial notch. On reaching the valley floor, Beaver is joined by the Boyne, makes a northward bend and follows bed of the glacial valley until it reaches Georgian Bay.

Three miles down from the bend, the Beaver receives e of its water which is brought through a flume across the 500-t drop from the Eugenia reservoir and is utilized for producing rly 1,000 h.p. of electrical energy. From the bend down to berley, the river has an even, regulated, and sustained water ply, a rocky bed and a clear channel. The wooded slopes, the ar river, the grassy and wooded valley floor, combine to offer y recreational facilities not found in many areas of comparable e in Southern Ontario.

From Kimberley to Heathcote, the valley widens, and is vily wooded, and the river meanders frequently. At Heathcote the er cuts through a moraine (the only one in the valley) before ering the low plain. Its waters become muddy before it descends m an old lake bluff at Clarksburg and drains into Nottawasaga at Thornbury.

Upstream from Thornbury the river has been controlled, its waters spread in a small reservoir. Sufficient hydro-electric er is produced in this part to supply the local needs of Thornbury Clarksburg. Recently some of the water has also been used to igate the extensive delta orchards that surround Clarksburg and rnbury. The spring bloom of these orchards is surpassed in beauty y by the autumn colouring in the woods covering the upper part of Beaver Valley.

"Thus, even though small and obviously a unit, the Beaver Valley exhibits considerable complexity of land forms ...... it is a picturesque place. The greenish-blue waters of Georgian Bay, the orchards near the shore, the mosaic of fields upon the gentler slopes and forest belts upon the valley floor, and the steeper slopes just

"below the limestone crags, all combine to form a geographic personality and a natural beauty which once seen is not soon forgotten"*

(c) The Bighead River and its Basin

The Bighead basin does not possess the same impact s the spectacular Beaver Valley, but has a more diffused kind of eauty. The Bighead Valley is also pre-glacial and also occupies broad notch in the escarpment but the post-glacial stream, the ghead, snakes through a hummocky, drumlinized basin. The general irection of the river lies at right angles to the lie of the drum-ns which sometimes enable, and at other times force, the river to irt around them. It is in such locations, where the river lies sconced between the drumlins, that one finds places of great local narm. Two such examples are the oval bend enclosing the drumlin orth-west of Elmhedge and the longish bend which encloses a pair of rumlins just south of Oxmead.

Unlike the Beaver Valley which can be seen in all its mpleteness from many points on its banks and even from its floor, e Bighead basin is more spread-out, and the view is frequently ocked by the drumlins. Nevertheless, excellent panoramic views large parts of the basin can be enjoyed from a number of strategic stas, such as Griersville rock (the exposed edge of the escarpment), d the ridge tops south of Minniehill, Blantyre and Rocklyn Creek. om these points, one sees hill upon round hill rolled out in end-ss succession, their graceful slopes and shallow saddles enriched th a motley pattern of fields, woods and homes intermingled and hancing one another's beauty.

Although the Bighead is a smaller river and drains a aller basin, its watershed is more homogeneous and compact. Its annel is often deeply cut into the land and the waters, though allow, are not as clear as those of the Beaver.

Chapman, J. L. and Putnam, D. F. The Physiography of Southern Ontario, 1951 - pp. 144-145.

(d) The Sydenham and Pottawatomi Rivers

In many ways the Sydenham resembles the Beaver on a mall scale. It originates in Williams Lake and, like the Beaver, lows westwards before adopting its final northward orientation. nlike the Beaver, however, for the better part of its course from llivan Mills to Inglis Falls, it flows through a drumlinized ountryside, but has managed to keep a straight course. At Inglis alls it tumbles down the notch in the Niagara escarpment and flows hrough a "little Beaver Valley" of its own, before emptying into ne lake at Owen Sound. In this part below the Falls, it has a arrow but well-filled channel and an even flow.

Before reaching the city limits of Owen Sound, the iver flows over a flat floor and winds between heavily wooded lopes. This area has been developed into a public (Harrison) park, nich is a well-managed recreation area. The river itself serves ore as an ornament rather than a resource of the park. In the inal reaches, within the city of Owen Sound, however, it becomes eavily polluted.

(e) The Pottawatomi Valley

The southern tip of Owen Sound (Bay) also receives the ters of a smaller river, the Pottawatomi. The little stream riginates in a heavily wooded and rather swampy depression covering e north-west corner of the Region in Derby Township. On approach-g Owen Sound, the virile river incises deeply into the escarpment ope producing a small fall, and its wooded banks east of Spring-unt are quite beautiful.

The valleys and the river basins mentioned above occupy re than two-thirds of the area of the Region. They also possess e bulk of the recreational potential, only a fraction of which has en developed so far. This is not the case in the shoreland zone, ere the recreational facilities are not very varied but are very ll developed.

(f) The Shoreland

The shoreland consists of a narrow belt of shale plains ronting the lake waters, and generally about a mile in width. They re drained by small creeks, and have rather poor soils. The only xtensive part which lies outside the basins of the large rivers, s well as outside the shoreland, is drained by small, independent treams. This is an agriculturally poor zone. Fortunately the en- ire zone is serviced by a provincial highway and fronts on the aters of the Georgian Bay.

The recreational facilities of this zone are limited o swimming and sunbathing, which fortunately happen to be the most opular form of outdoor recreation for the average Ontarian.

(g) The Big Hump

The big hump of land, or the broad peninsula in ydenham and St. Vincent Townships, consists of an undulating upland kirted on the outer side by a steep drop to the lake. It has lime- ich soils which are well drained and well wooded and in the eastern art support rich orchards. The most scenic part of the peninsula ies in the north from Vail Point to Rich Point. The wooded banks f the Sucker Creek, the extensive and magnificent clay banks rising heer from the waters to a height of nearly 375 feet, and the deeply heltered Mountain Lake with its rustic and compelling beauty, all roduce a scenic variety.

. Climate

Topography provides the initial setting for recreational acilities; climate determines the nature of recreational activity, nd, of course, the times when a particular activity can be best njoyed. The area occupied by the Region is small and ordinarily ould not have too great a climatic variety, but, fortunately, the ifferences of topography, relief and altitude, and the presence or bsence of a facade on lake waters, are factors which induce notice- ble climatic variations within the Region.

There are only two stations within the Region (Eugenia ınd Ravenna) for which meteorological records are available, but it is possible to get a general climatic picture of the Region by supplementing these records with information from other sources, such as the records for the nearby meteorological station at Durham, and bservations at the harbours of Owen Sound, Meaford, and Collingwood, ınd at certain private institutions. For the purposes of recreation, eference is made only to those highlights of the climate which in-'luence a particular kind of recreational activity in areas specifi-ally suited for it.

(a) The Blue Mountain

Ravenna lies close to, and at the same altitude as, the op of the Blue Mountain, and temperature conditions in both places ay be taken as similar. As this area has few lakes or large rivers, here is little recreation activity in summer except for occasional iking. On the other hand, the area offers excellent facilities for ll kinds of winter sports. The average snowfall between November nd April, even at Ravenna, is about 100 inches - the slopes facing he lake naturally get a little more snow. Owing to the northern acade, these slopes are also more protected from the sun than avenna, and the snow cover here is usually deeper and lasts for a onger period than at Ravenna. In most years, a minimum cover of 5-inch deep soft snow lies at least from mid-December to the end of arch. At the height of the winter season, the snow is deeper and hicker, and January and February are ideal for skiing. One of the .nest ski-clubs in the province is located on these northern slopes.

(b) The Lake Shore

Just as the winter climate determines the recreational ılue of the Collingwood mountains, similarly the summer climate is .l-important for the recreational value of the lake shore. The daily ean maximum temperatures in June, July and August throughout the lake ore zone are 3° to 4° higher than at Ravenna, and range between 80° ıd 90°F on sunny afternoons. The surface temperatures on the sandy aches at Meaford, Sunnyside and Kiawanna are slightly higher. The

water temperatures are 8° to 10° cooler, afternoon temperatures averaging 68°F on sunny days. The average rainfall in each of the summer months is about 2 inches, and clouds associated with it may sometimes mar a holiday, but this is compensated by long dry spells which are common in most years. Many summer cottages are occupied as early as May, but the rush season begins after the end of the school year in June. In July and August, all available beaches are crowded by cottage owners and visitors alike.

(c) <u>The Beaver Valley</u>

The climate of the Beaver Valley is suitable for both winter and summer recreation. The temperature records for Ravenna and Durham hold good for the upland on either side of the valley. The temperatures on the valley floor are 2° to 3° higher in all seasons.

During the summer months, the valley floor between Kimberley and Heathcote (the widest part of the valley) registers mean daily maximums of about 78°F in June, July and August, the figures upstream from Kimberley and downstream from Heathcote being a degree or so lower. Frequency of shade, and proximity to water makes for slightly cooler conditions close to the river. The river waters are shallow for the most part, and 15° to 20° cooler than the land surface (about 60°F). To interest the public in using these waters for swimming, it would be essential to raise the surface temperatures to 65°-70° at least, either by by-pass ponds or by small dams.

Although protected, the valley slopes receive nearly 5 inches of snow between November and March. December, January and February receive the most snow and the least rainfall and the shape and orientation of the valley protect the snow from melting, as well as from the winds and blizzards which are more pronounced on the open ski slopes of the Blue Mountain. There is a small ski club at present, but demand for skiing is increasing, and sooner or later ski facilities will have to be enlarged. The Beaver Valley, by its physical geography, is the only area in the Region which offers facilities for both winter and summer recreation, facilities which have yet to be developed.

(d) Sydenham and Pottawatomi Area

On a small scale, climatic and topographic conditions in this area are not very different from the Beaver Valley, and both summer and winter recreation is possible. The water temperatures are satisfactory for swimming, from the pond above Inglis Falls downwards, on the Sydenham River. Although smaller than the Beaver Valley, this area has an advantage inasmuch as it lies adjacent to an urban centre. At present, recreation activity both in summer and winter is concentrated in Harrison Park. A few years ago a local skiing enthusiast built a small ski tow which is crowded during weekends in January and February.

(e) The Rest of the Region

The rest of the Region is largely an upland area, lying away from the shore, and comprises the upper watersheds of the Bighead, the Beaver and the small streams in the broad peninsula between Meaford and Owen Sound. No records are available, but similarities of aspect, altitude and relief suggest that the climate of this area as a whole is exemplified by the climatic statistics of Ravenna, Eugenia and Durham. The daily maximum temperatures of approximately 75°F during June, July and August, and close to 32°F during December, January and February. The annual precipitation is about 30 inches in the south-western and eastern margins of the Region and decreases towards the centre; Eugenia, on the brow of the escarpment, receiving only 18 to 20 inches. Winter precipitation is slightly higher than in summer over most of this section, and nearly a third of the total precipitation occurs as snow. From the point of view of recreation and travel in the area, summer and autumn are the best periods.

. Forest Cover

The forest cover not only enhances the beauty of an area, but if well-managed, it adds to its recreational value by stabilizing its waters, and by offering protection to wild game of different kinds.

(a) The Blue Mountain

The bulk of the hilly slopes have a dense forest cover of great value and beauty. This forest cover and the small size of streams in this area reduce the erosion danger on these steep slopes. On the other hand, there is an increasing tendency to clear sections of the northern slope in response to the mounting demand for wider and longer ski runs. During the summer these ski runs have neither the protection of trees nor that of snow, and considerable sheet wash occurs, as can be witnessed by the muddy creeks and depressions at the base of the hills on the northern side.

(b) The Shoreland

Despite its suitability for settlement, recreation and other developments, most of the land fronting the shore is still in trees. There are at least five long stretches of wooded land. The longest stretch (12 miles) extends from the Black Bass Bay to Thorn-bury, with only one relatively bare patch ($1\frac{1}{2}$ miles long) west of Craigleith. The lake front in the vicinity of Craigleith has been reforested and its neat young pine trees now provide a beautiful ribbon of managed parkland known as Craigleith Park. Another broad but short stretch of woodland lies just east of Meaford (1.5 miles x 0.3 miles), the western section of which now belongs to the Meaford Memorial Park. The third long stretch covers most of the land between the escarpment and the shore from Sunnyside Beach to Vail Point, and is completely protected since it became a part of the Tank Range. The fourth stretch (15 miles long) extends almost unbroken from Vail Point to Leith. There is a small block of swampy woodland occupying the inland depression behind Paynter Bay and Squaw Point. Proximity to Owen Sound and frontage on the highway to Leith has led to the develop-ment of shore cottages in most of the wooded lakeshore between Squaw Point and a mile north of Keefer Creek. There is every indication that cottage development will continue northward at least up to Coffin Cove which has a sandy beach.

Most cottage owners appreciate the shade and privacy offered by the trees so that cottage development on the shoreland does not usually threaten removal of the woodland. However, this is not true of the six-mile-long bare stretch between Sunnyside and Meaford which has been cleared of trees. The only other bare stretch lies in the area between East Meaford Creek and Thornbury - north of No. 26 Highway. A small part of this area is being reforested as part of the Grey County Forest.

(c) The Beaver Valley

The floor of the Beaver Valley is heavily wooded from the head almost down to Heathcote. Large tracts on both the slopes have, however, been cleared for crop and pasture. Alternating with woodlots they produce a very striking scenery. Both the slopes south of Kimberley, and the eastern slopes descending from Duncan Lake still retain the bulk of their woodland. The narrower stretch of the valley from Kimberley upwards forms a continuous wedge of green during the spring and summer and of gold during the autumn. Most of the wooded land in this section has been acquired by game and fish clubs through purchase or lease, and is well preserved.

(d) The Upland Areas

All the three upland areas, the broad peninsula, the upper basins of the Sydenham, the Bighead and the Beaver (above the escarpment) are extensively wooded. The largest single tract of heavily-wooded land stretches from the back of the Blue Mountains south-westwards, covering the entire basin of the Kolapore Creek, to Eugenia in the south and to the brow of the escarpment near Duncan Lake in the west. The broad upland (in the south-west corner of Sydenham Township) which separates the Sydenham and Bighead River watersheds is also heavily wooded. The same is true of the rough morainic and drumlinized country in the south-western section of the region (in Sullivan, Holland and Euphrasia Townships).

Despite the high proportion of woodland to total area (25 per cent of the Region) it may be noted that publicly-owned woodlots are few and far between, and occupy mostly areas of no striking recreational value. On the other hand, in such promising areas as the

Beaver and Sydenham Valleys, the Blue Mountain and the shoreland, almost all woodland is owned privately.

.. Wildlife

The Region possesses a great variety of wildlife, of which many species contribute to the recreation of hunters, anglers and naturalists. The diversity of cover and the large area of second growth woodlands and shrubby vegetation found along the escarpment edges and in other parts of the watershed have provided excellent habitat for deer. There were open seasons on deer in parts of Grey County in five of the six years from 1953-1958 and hunter success was high. The population was still high at the beginning of 1959.

While deer and beaver (also common in several wet areas) are the most spectacular species of wildlife, many others such as wildfowl, partridges, the European hare, and foxes are also common on suitable land or water areas.

Since the great decline of lake trout populations in Georgian Bay, fishing with boats going out from Meaford and Owen Sound is no longer an important source of tourist revenue. However, there still remain many streams which provide excellent fishing for trout, and only a few (notably parts of the Beaver and Sydenham Rivers) are posted against fishing. The stocking of fish in depleted lakes and ponds has almost certainly improved the fishing but there is little concrete evidence that stocking of fish in streams has had much effect, except in the upper part of the Sydenham River, where fishing for brown trout is excellent.

For those interested in natural history it should be added that more than 200 species of birds have been noted in the North Grey Region. There is also an extremely interesting distribution of rare wild flowers and ferns along the edge of the limestone cliffs. Some of these, such as the Hart's-tongue Fern and the Walking Fern are common only in this Region and in the Bruce Peninsula.

Summarizing all the information in this chapter, it is seen that the North Grey Region is not only an area with great possibilities for recreation, but is also one of the few extensive areas within 120 miles radius from Toronto and Hamilton which can offer recreational facilities in all seasons.

CHAPTER 4

EXISTING PUBLIC PARKS

. Derby Township

Derby Township has a population of 1,849 (1959), lmost all of it being rural. More than two-thirds of its area, hree-quarters of its population, and all of its parkland lie ithin the Region. The last is all contained in Harrison Park hich is the largest tract of parkland, not only within the ounty, but within a radius of 65 miles from Owen Sound. All ut six and three-quarter acres of this park lie within the ownship, but the park serves the population of the adjoining ity of Owen Sound rather than of the township. The demand for ark areas will increase with the growth of the city, and the ost promising areas for parks lie in Derby Township.

. Owen Sound

By virtue of its location at the head of the wen Sound Bay and at the mouths of the Pottawatomi and Sydenham ivers, Owen Sound was destined to become the natural and the argest centre on Georgian Bay. It is a comparatively small ity with a population (1958) of 17,506, but it is an important ne. It is the focus of three provincial highways (Nos. 6, 10, 6) and, apart from Hamilton and Guelph on No. 6 Highway, Owen ound is the largest urban centre on any of these three highways. n permanent population Owen Sound has grown more slowly than any other Ontario cities, but the seasonal fluctuation in popu-ation is important. During the summer when lake commerce is at ts peak, Owen Sound, being a grain distribution centre, becomes a very busy city. In addition, it is a resting point for many ourists bound for Bruce Peninsula, Manitoulin and other islands n the Georgian Bay. No firm census of the summer population has een taken but all available official and unofficial estimates, ndicate that during the three summer months, the city population egisters at least a 30 per cent increase. As summer is also

he chief recreation season, one must not ignore this additional opulation pressure when assessing the parks and park needs of he city.

The city lists a parkland area of 49.5 acres ithin the city limits. Measured against the normal city opulation, this gives a parkland share of 2.8 acres per 1,000 ersons, which is very low by any standard.* On the other hand, he city does use Harrison Park which would raise the share of vailable park area to almost 8 acres per 1,000 persons. This oes not include the added population pressure during the ummer months, nor does it take account of the fact that only a mall proportion of Harrison Park is actually developed and used or recreation and that not all the city's own parks are by any eans suitable for outdoor recreation.

(a) Victoria Park

This is the largest single tract of open space ithin the city. It is a triangular plot of land enclosed by hree roads each with residential strips on both sides. The entral space, which is cleared of trees, accommodates a race rack, a soccer and football ground and a baseball diamond. n other words, it is an open-air sports stadium rather than park. Treed area is restricted to the western side, and screens ff the built-up area. Picnic facilities are limited. The earth of trees, the absence of any streams or other water bodies, nd the rush of spectators attending games, all discourage icnicking in the area.

It is the consensus of almost all planning authorities that 5 acres per 1,000 persons is the absolute minimum parkland desirable in urban areas.

(b) St. George's Park

In lieu of the land acquired, the Department of ighways and the City of Owen Sound agreed to convert the wedge f land formed by Tenth Street East and Fourth Avenue (below the scarpment) into a children's park. This is St. George's Park. t also has a baseball diamond, a lawn bowling green, a tennis ourt and facilities for smaller children, such as swings, see-aws, and a small wading pool. The park is covered with grass nd bordered by trees; there are eight picnic tables, and a ozen benches, which are used mainly by the students of the djoining schools and by the nearby residents.

(c) Queen's Park

Although the official city map shows the entire trips bordering the Sydenham River between Eighth and Tenth treets as park area, only the narrower, western high bank is ctually developed as a park. A quarter-acre plot also lies outh of Eighth Street. This western strip is well grassed and otted with a number of flower beds.

(d) Other Parks

St. Julien's Park and (more recently) Harrison's ield have softball and baseball diamonds and swings and slides or children. St. Julien's also has two tennis courts. Evan's, imy and Bayview parks are small plots of land with swings and lides for children. To conclude, these and other parks mentioned bove are essentially playgrounds for the younger folk. Only ueen's Park is an exception and is frequently used by adults.

Of the other areas listed as parks, Owen Heights s merely a bare quadrangle, surrounded by newly-built bungalows, nd the remaining places classified as undeveloped parks are so esignated because no other use for them has been discovered. For he recreation of the general population, the city depends almost ntirely on Harrison Park.

(e) Harrison Park

In 1856, a local lumber merchant deeded 51 acres

of treed land mostly in Derby Township adjoining the south end of the city and bordering on both sides of the Sydenham River. This land consisted mainly of the ravine and flats created by the Sydenham across a glacial terrace lying between the two sides of the escarpment. A further grant of 45 acres of land also in Derby Township brought the park to its present area. The land lay undeveloped until the beginning of this century, when improvements were initiated and subsequently expanded. Fill and topsoil were added to areas around the trees and the bottom flat was sodded wherever bare. Small bridges and service roads were also built to attract more tourists. At present, the park offers more tourist and recreation facilities.

Tourist accommodation for 118 persons is provided by 40 detached cabin units which are rented at the rate of $14.00 a week for single and $20.00 a week for double cabins. There are 21 single cabins (accommodating two persons each) and 19 double cabins (for four persons each).

Trailer and camping facilities are also provided on a two-acre area marked for that purpose. The park has a large picnic area, providing sheltered seating accommodation for 315 persons. There are nine tables, each accommodating 35 persons. These can be rented for $1.00 per day. Besides, there are 70 outside tables which are for free use of the visitors. Close by the cabin, camp and picnic area, the park has an inn which will supply meals at cost, a community hall which is rented for dancing and celebrations, and a bandstand. There are two swimming pools, one 70 feet x 20 feet and another 70 feet x 28 feet, adjoined by two dressing rooms and two shower units. As there are no swimming facilities within the city or even in a radius of five miles from the city limits, and as the park swimming pools are free, they are naturally overcrowded. The park employs a superintendent to teach and supervise the swimming.

The Sydenham River, which in the southern part of the park flows swiftly over a rocky bed in picturesque surroundings,

s not safe for swimming. Farther downstream, the river fans ut over the flat clay land and is muddy and sluggish.

At the present time the river is used either for ishing which is free, or for boating, the canoes being rented y a private concern for 60 cents an hour. The meandering river s crossed by small, brightly painted bridges and there are a umber of riverside trails leading to wooded slopes. The park s richly endowed with a variety of trees, such as elm, maple, eech, spruce and pine.

During the last three years a local ski-fan has lso installed a ski tow which is in keen demand over the week-nds in the winter season. This man plans to increase the winter ecreation facilities.

. Meaford

The town of Meaford (population 3,640) has 38 cres of park area. This consists of four parks: Roper's Park, illow Camp, Beautiful Joe Park and the Community Park.

(a) Roper's Park

Roper's Park is a narrow strip (one acre) of rassed and shaded land lying between No. 26 Highway and the akeshore, one-third of a mile west of the mouth of the Bighead iver. The park contains a small pavilion (to seat 100), 15 nches, three picnic tables and children's swings and slide. .though it gets quite crowded on hot afternoons, further :pansion is not possible.

(b) Willow Camp

This park consists of three acres of grassed and 'eed land at the corner of Bayfield and Parker streets. It lies .ose to the Meaford harbour and a lakeside Motor Court. The irk has 10 benches, tables to accommodate 50 persons and a sand x for children. Judging from repeated observation, it is pular mainly with elderly people. This park also cannot be :panded.

(c) Beautiful Joe Park

The ravine land formed by the last-but-one bend of the Bighead River before it empties into the lake, used to be a recreation area 50 years ago. For some reason or other it fell into disuse and has not been developed since. In 1894 a native of Meaford wrote a storybook based supposedly on the life of a dog named Beautiful Joe who was subsequently buried in this ravine.

The ravine is well wooded, and special mention may be made of a 175-year-old sycamore tree which is unusual in this part of the province. The river water here is shallow but not very clean. The ravime area would make a very good local park.

(d) Community Memorial Recreation Park

This park occupies 29.75 acres of land at the eastern end of the town. It has a 30-foot-wide sandy beach which slopes gently into the lake. The 20 acres forming the western end of the park are densely covered with trees, mainly maples, cedars and poplars. Shade, water and beach make this area an ideal recreation area easily accessible to the summer tourist from No. 26 Highway. Very good swimming is also available.

The park has five acres of wooded land reserved for campers and another three acres for trailers. Town water is supplied free and firewood is sold at a nominal price. An open, five-acre field across the road from the camping area is sometimes used for ball games.

Swimming instruction is given and life-guards are provided by the local Water Safety Committee and the local Red Cross, who employ two swimming instructor-life-guards. On a bright, warm afternoon about 500 swimmers use the beach. From 7 camping families in the summer of 1956, the number nearly doubled (147) in the summer of 1957.

Collingwood Township (Population : Township - 2,112, Thornbury- 1,112)

This township has 45 acres of park area, 40 of which lie in the newly-developed Provincial Park near Craigleith

in the Community Park at Thornbury and 2 occupied by the mmunity grounds at Ravenna.

(a) The Ravenna Community Grounds

The grounds consist of an open two-acre plot at e edge of the hamlet and are neither used for any recreational rposes, nor do they possess any recreational facilities and tential. It is merely the open land surrounding the township ll at Ravenna.

(b) Craigleith Park

This park occupies a narrow strip of wooded land tween Highway No. 26 and Georgian Bay, just north of the hamlet Craigleith and about eight miles west of Collingwood. It is e of many parks operated by the Parks Division of the Department of Lands and Forests, and is used mostly for picnicking, imming and overnight camping for which it is expressly designed. ring the summer of 1957,7,200 persons used this park.

The park has a 27-acre beach fronting the water r nearly a mile. The beach consists of shale and limestone abs, and, although less comfortable, it is certainly different om and cleaner than the sandy beaches elsewhere along Georgian y, and provides good swimming.

Thornbury Memorial Park

Thornbury, with a population of 1,112, has a small rk of 3 acres occupying a narrow lakeshore strip at the eastern ge of the town. The beach is quite poor and in many places it covered with grass. The park is fringed with cottages which event its expansion.

Artemesia Township   Population 1,829 - Village of Flesherton Population - 480

This township contains 24.5 acres of parkland all which lies in or near the village of Flesherton. It is in three parate sections. There is a half-acre lot around the Township ll north-west of Flesherton which serves mainly as a parking t for visitors' cars and the road-repairing vehicles.

he largest tract is the 19-acre Agricultural Grounds east of lesherton, which belongs to the Agricultural Society of East rey.

, Flesherton Memorial Park

This roadside park lies in the western corner of e town south of No. 10 Highway. It is well grassed and well eed and provides picnic facilities.

Much busier than the park is the nearby mill pond ich belongs to a local chopping and planing mill. The mill and e local service club and Recreation Committee have co-operated d developed the pond for swimmimg. Two swimming instructors are red to supervise swimming and to give a five-week course in imming to the local children.

CHAPTER 5

IMPORTANT PRIVATELY-OWNED RECREATION AREAS

Commercial Recreation Areas may be defined as those reas where the property is owned or managed privately but the owner ents recreation facilities to the public. In some cases no large roperty need be owned, yet the management may still provide facili- es for public recreation on quite a large scale. For instance, acht clubs and boat rental concerns own only a small piece of shore roperty but by using public waters they provide quite considerable ecreation facilities and for this reason should be discussed under e heading, Commercial Recreation Areas.

These areas happen to be the major source providing rge-scale public recreation in the North Grey Region. Six areas me under the category of Commercial Recreation Areas as defined ove.

The Blue Mountain Resorts

The Blue Mountain Resorts is the largest commercial nture of the Region in the field of outdoor recreation. The operty contains 880 acres of land in Lots 16, 17, 18 and 19 of ncessions II and III of Collingwood Township. It is located 2 les from No. 26 Highway, or a mile south of Craigleith and less an six miles west of Collingwood.

The bulk of the property comprises the northern slope the Blue Mountain, extending from the crest to the floor. The erage gradient is 8 to 1; the snowfall on this lakeward slope is e highest in the Region, approximately 100 inches in the three nter months (December to February). Often the snow cover remains asonably deep up to the end of March. Elevation, slope, and snow er combine to make this property ideally suited for winter sports. other large skiing area lies so close to the urban belt of thern Ontario. The growth in the prosperity of urban areas has n paralleled by increased interest in sports of all kinds. The idly increasing use of the automobile, and particularly the com- etion of Highway No. 400 are also factors which have contributed making the Blue Mountain Ski Resort a very popular and profitable nture.

The average skiing season lasts for 18 weeks (December to March) and over the past five years more than 200,000 skiers have taken advantage of the facilities. The winter of 1956-57 brought the highest number of skiers - 51,000.

2. <u>The Arrowhead Ranch</u>

This property lies only a mile north of the ski area and is used primarily for summer recreation for which it is well suited. Of the 198 acres, 160 acres are wooded. There is a great variety of trees, although 90 per cent of them are hardwoods. Maple and birch predominate - evergreens are found mainly nestled in the hollows between the ridges. Most of the trees are rather young - few exceeding 15 inches in diameter. All through the spring to fall the woodland changes its colours and patterns and is a hiker's dream. Springs and creeks, rock outcrops and steep slopes, trails now in dense woodland, now in open scrub - all combine to enhance the enjoyment of the riders and the young explorers.

The project started out by providing tent accommodation for the boys, but the number of customers even in the first year was large enough to enable and justify the expansion of the camp into a more permanent type of development. From a strictly boys' camp it grew into a recreation ranch catering to boys, girls and even to their families.

Sports facilities provided include horse riding (the management owns 35 horses), picnicking in the woods, hiking in bush trails and other sports facilities and outdoor games such as horseshoe pitching, archery competitions, training in lassoing, open air square dances and, of course, the usual hamburg fries and wiener roasts. More recently, swimming trips to the lakeshore have also been included in the recreation program. As this ranch lies close to other recreation areas, such as Craigleith Park, Wasaga Beach and the entire string of summer cottages between Meaford and Collingwood, many parents are inclined to send their boys and girls for a day at the ranch, and it is these boys and girls who later go to the ranch for a longer holiday on their own.

3. The Beaver Valley Ski Club*

This ski property is located adjacent to and north of Bowles Gully, occupying 115 acres in Lot 1, Concession VI, of Euphrasia Township. It contains 65 acres of dense woodland occupying the steep slope and the flat roof of the escarpment in the southern section. The trees here are larger in size than in other parts of the Beaver Valley, 75 per cent having a diameter between 5 and 15 inches. Most of them are hardwoods - mainly maple and birch. The flatter slope in the north has been cleared and forms a broad strip right down the slope. This strip is 100 yards wide and 300 yards long, the difference in elevation between the top and the bottom of the strip being 800 feet - or about the same as in the Blue Mountain Area. It is this strip which has been developed into a ski area.

Compared to the Blue Mountains which is a well-established large-scale operation, the Beaver Valley Ski Club is a small, one-man venture. Its skiing facilities are rather limited, for it contains only a single and rather narrow ski-stretch which is served by a single ski-tow. The heaviest attendance on a week-end was 310 which is about all that the ski grounds can accommodate with ease. On the other hand, it has certain advantages over the Blue Mountain resorts. For instance, it charges lower fees for skiing on a small but open and less-crowded slope, located in extremely scenic surroundings. It possesses a unique feature - for the skiers have the choice of reaching the ski ground by car, either at the foot or at the top of the slope. There are few known ski grounds where the skier can drive to the top end of the slope. The great advantage of course is that while the Blue Mountains are more than 50 miles from Owen Sound and more than 100 miles from Toronto and Hamilton - (the centres from where most skiers come) - the Beaver Valley ski grounds are less than 40 miles from Owen Sound and less than 90 miles from Toronto and Hamilton.

To many people this is known as the Eugenia Ski Club - although a small resort on the southern edge of the village of Eugenia is also called the Eugenia Ski Tow.

4. Meaford Golf Club

This golf club lies at the western edge of the town and occupies 98 acres in the eastern half of Lot 17, Concession VI. Previously this land was in the township; now it is a part of the town of Meaford. This land, a gently rolling field at the headstream of a creek, has been converted into a 9-hole golf course. The property contains about 10 acres of woodland most of it in a small compact woodlot at the western edge of the golf course.

5. Duncan Lake Scouts' Camp

Duncan Lake lies 3 miles east of Kimberley at the top of the escarpment in Lots 8 and 9 of Concession II, Euphrasia Township. Originally, it was a glacial pothole deep enough to tap a few subterranean springs which are the main source of its water supply. The lake is drained by a small (Duncan) creek which joins the Mitchell Creek three miles eastwards. The banks are quite high - on the west rising in places to about 20 feet from the surface. It has a muddy bottom and no beach, not even on the low eastern bank.

It is completely surrounded by woodland which contains mainly deciduous trees. Although the trees are not large, they grow very close to each other and dead wood rings the water's edge on all sides. The chief game fish in this lake is the smallmouth bass, although there are reports of rainbow and brown trout.

A few years ago the Progress Club, Collingwood, acquired the western half of Lot 8, Concession II, Euphrasia Township, and established a boys' summer camp. The property contains 22 acres of densely wooded land - the balance of the lot area is water.

Duncan Lake is ideal for a boys' camp. Its popularity is increasing. During the past three years the camp has had a registration of 50 to 100 boys per week in the months of July and August. The management hopes to secure higher registration and plans to use the accommodation in the new building, not in lieu of, but in addition to the accommodation provided in tents.

6. The Blue Mountain Camp for Crippled Children

This property lies on Nottawasaga Bay near the north-eastern corner of the North Grey Region and occupies 21 acres of shoreland in Collingwood Township. The property belongs to the Ontario Society for Crippled Children and has been developed by the Organization and is one of the five camps the Society maintains for the use of crippled children in the Province. The camp is financed partly by the parents of the children, but mainly by donations from philanthropic organizations and individuals and subsidies from the Provincial Government. It is one of the largest of its kind in Canada.

The project was initiated in 1937 and now provides convalescence, therapeutic treatment and recreation facilities for children physically disabled by poliomyelitis and other diseases.

The property contains a magnificent lounge which accommodates the community's dining, dance and recreation hall. It has a glass-fronted veranda facing the lake. Occasionally, the hall is rented out for the meetings of service clubs and other organizations. The camp includes 9 dormitories providing accommodation for 72 children, 3 staff houses for the supervising and service personnel, an infirmary, an art and craft building, a library, a playhouse, a swimming pool and change house and a workshop and other service quarters.

The property has a sandy beach 300 feet by 600 feet and a large playground. The latter was donated five years ago by the Ladies' Auxiliary of the West Toronto Kiwanis Club.

The above-mentioned built-up or used area occupies 14 acres of cleared land, although it may be pointed out that care has been taken to retain as many trees as possible even in the built-up area. To enhance the beauty of the camp many flower beds have been laid out. The 7 acres of uncleared land contain mainly hardwoods and may be considered as the reserve area - reserved for possible future expansion.

On the whole, this camp is an efficiently managed nd self-sufficient recreational institution which is serving an ssential and admirable purpose.

CHAPTER 6

PROPOSED CONSERVATION AREAS

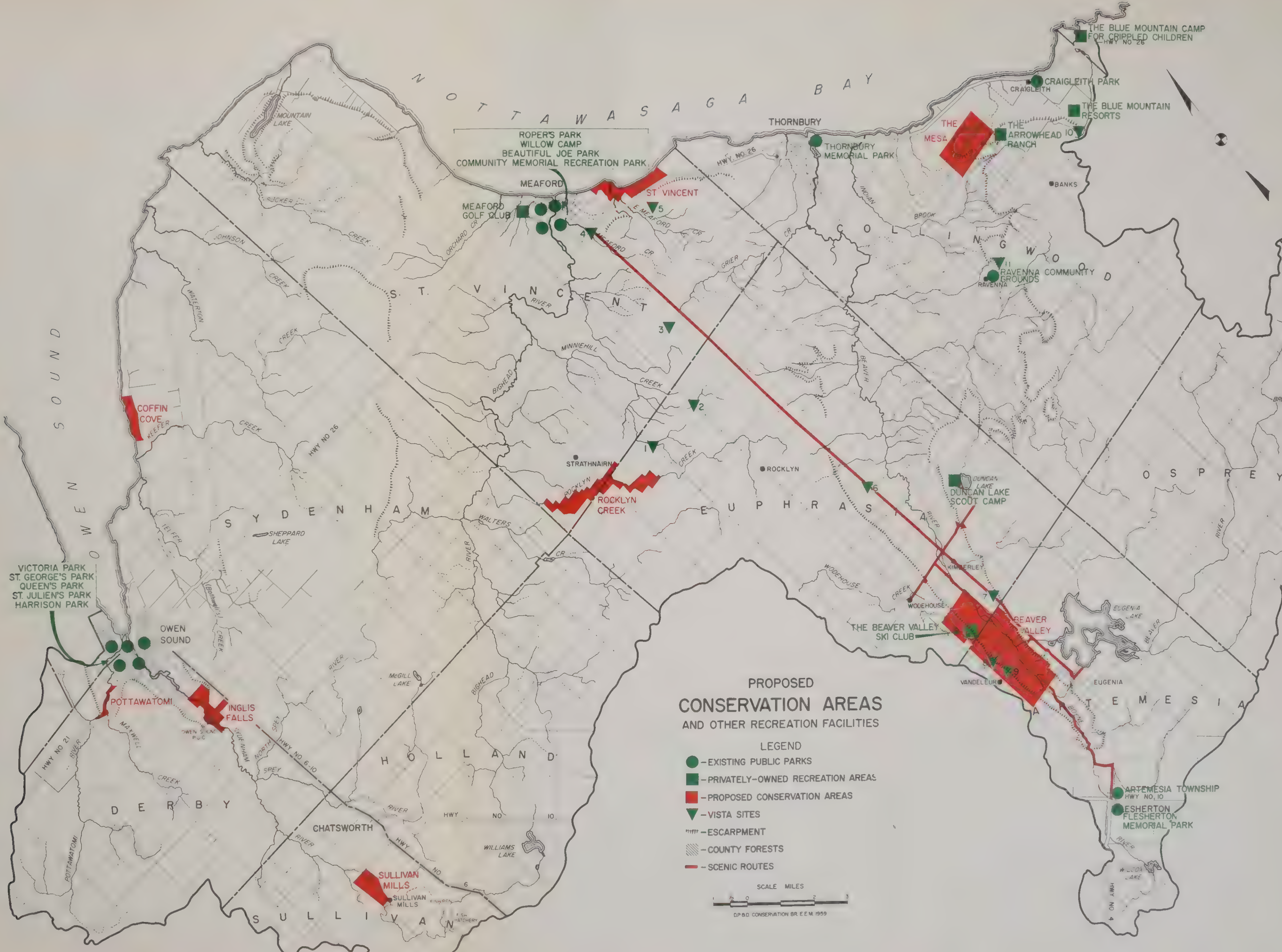
A study of the oreceding chapters of this report will indicate that the North Grey Region has many areas of considerable recreation potential. It is also obvious that not all such areas can be recommended for development as Conservation Areas. For this reason, only those areas are recommended which will be easily developed, will be of outstanding value and will have a ready clientele.

1. Beaver Valley Conservation Area

Creation of a 6,000-acre multipla recreation area in the upper part of the Beaver Valley forms the most important recommendation of the Recreation section of this report. Other parks recommended in the preceding pages are merely extensions of existing ones, and even after extension will have rather limited size and recreation facilities compared to the Beaver Valley. Doubtless they will absorb part of the growing tourist pressure from the south, but only a small part. It is suggested that the Authority channel its enthusiasm and resources initially to the development of the Beaver Valley Area. If it succeeds it will have created a park which for location and the variety of scenic resources, (such as the variety of topographic and aquatic features and the wealth of woodland and wildlife), has few parallels in Southern Ontario.

(a) Regional Location

Almost 3 million, or more than half the province's population, and the bulk of the urban centres forming 85 per cent of Ontario's urban population, lie within 100 miles of the proposed Conservation Area. The only large and popular recreation areas available to the urban centres lying within 100 miles of Toronto and within 100 miles of the proposed Area at present lie around Lake Simcoe, the south-eastern bays (Georgian Bay) in the vicinity of Wasaga Beach, and the ski areas near Collingwood and

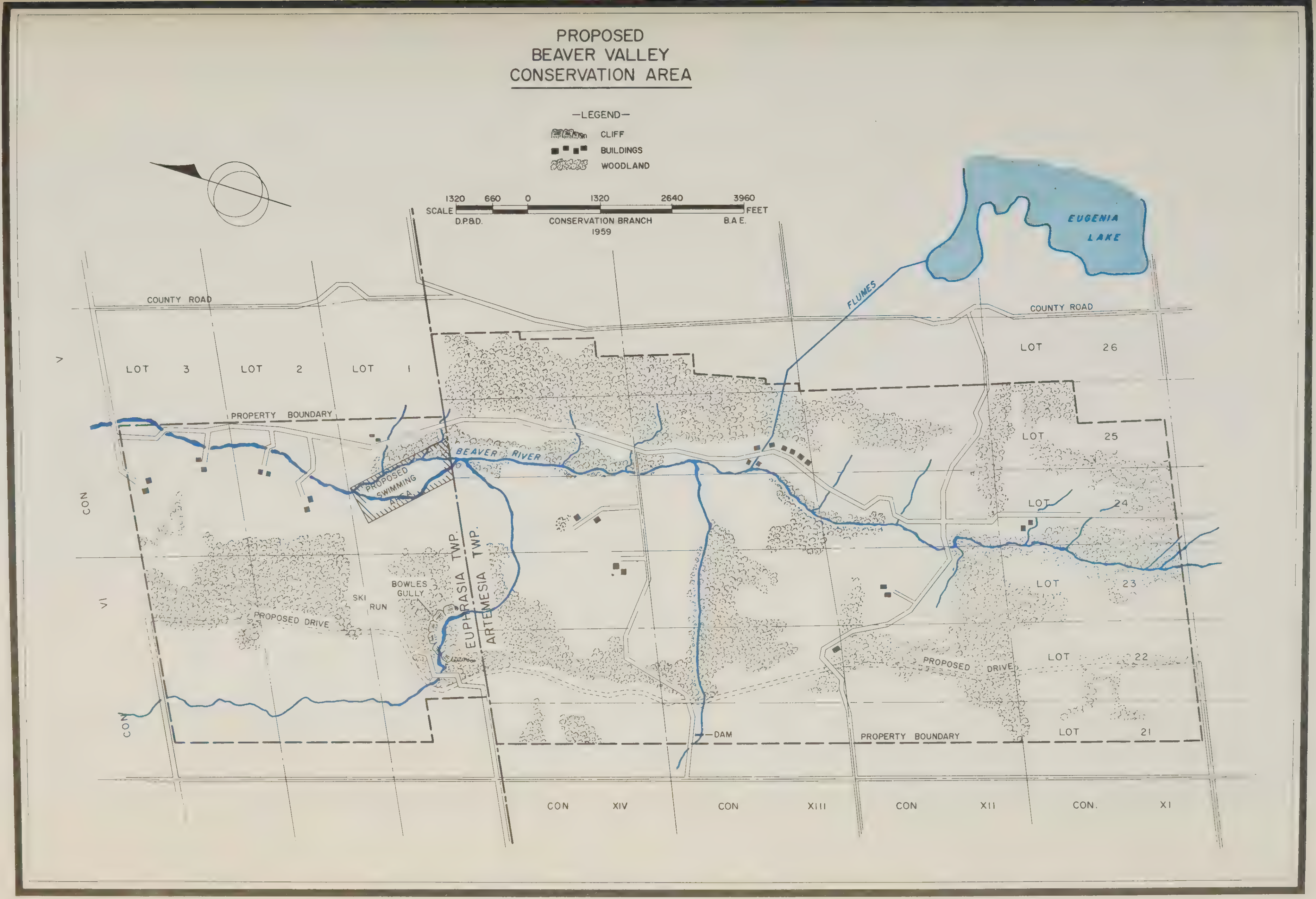

PROPOSED
CONSERVATION AREAS
AND OTHER RECREATION FACILITIES
LEGEND
- EXISTING PUBLIC PARKS
- PRIVATELY-OWNED RECREATION AREAS
- PROPOSED CONSERVATION AREAS
- VISTA SITES
- ESCARPMENT
- COUNTY FORESTS
- SCENIC ROUTES
SCALE MILES
DP&D CONSERVATION BR. E.E.M. 1959
NOTTAWASAGA BAY
OWEN SOUND
ST. VINCENT
SYDENHAM
EUPHRASIA
COLLINGWOOD
OSPREY
ARTEMESIA
HOLLAND
DERBY
SULLIVAN
THE BLUE MOUNTAIN CAMP FOR CRIPPLED CHILDREN
CRAIGLEITH PARK
THE BLUE MOUNTAIN RESORTS
THE MESA
THE ARROWHEAD RANCH
THORNBURY
THORNBURY MEMORIAL PARK
ROPER'S PARK
WILLOW CAMP
BEAUTIFUL JOE PARK
COMMUNITY MEMORIAL RECREATION PARK
MEAFORD
MEAFORD GOLF CLUB
ST VINCENT
RAVENNA COMMUNITY GROUNDS
COFFIN COVE
ROCKLYN CREEK
STRATHNAIRN
ROCKLYN
DUNCAN LAKE SCOUT CAMP
KIMBERLEY
WODEHOUSE
BEAVER VALLEY
THE BEAVER VALLEY SKI CLUB
VANDELEUR
EUGENIA
EUGENIA LAKE
VICTORIA PARK
ST. GEORGE'S PARK
QUEEN'S PARK
ST. JULIEN'S PARK
HARRISON PARK
OWEN SOUND
POTTAWATOMI
INGLIS FALLS
CHATSWORTH
SULLIVAN MILLS
ARTEMESIA TOWNSHIP
ESHERTON FLESHERTON MEMORIAL PARK
BANKS
CRAIGLEITH
MOUNTAIN LAKE
SHEPPARD LAKE
McGILL LAKE
WILLIAMS LAKE
BREWSTER LAKE
HWY NO 26
HWY NO 6-10
HWY NO 10
HWY NO 21
HWY NO 4
HWY NO 24

Midhurst. Summer resorts are virtually clogged during the holidays and even the winter resorts are fast approaching saturation point as is indicated by the continual addition and expansion of skiing facilities. The creation of a multiple-use recreation area in the Beaver Valley will therefore be a well-timed enterprise.

The Beaver Valley lies within easy driving distance of the metropolitan areas, each of which will use a different highway to reach the Area. In other words, the traffic to and from the Area will be distributed on a number of highways and not concentrated on any single highway as is the case with Wasaga Beach and Lake Simcoe resorts. For instance, tourists from London and Stratford have a choice of four highways, Nos. 21, 4, 23 and 19, before they reach Flesherton, the western approach point to the Beaver Valley. Traffic from Brantford, Hamilton, Kitchener, Waterloo and Guelph would mainly use Highway No. 6, while the shortest distance from Toronto-Oshawa region is via No. 10 Highway. Tourists from the Wasaga Beach Lake Simcoe area also have a direct highway (No. 26) which connects to Thornbury and Meaford, which in turn are connected by direct routes to the Beaver Valley.

The approximate highway distances from the various sections mentioned above are indicated below:-

Regions	Population	Via Highways	Distances in Miles
Toronto) Oshawa) Brampton)	2,000,000	10, 50, 27 400, 26.	100 - 120
Hamilton) Brantford)	300,000	6, 7, 8, 24.	100 - 110
Kitchener) Waterloo) Guelph)	150,000	6, 7.	60 - 80
London) Stratford) Woodstock)	200,000	2, 4, 19, 21, 23.	90 - 100
Lake Simcoe) Wasaga Beach)	Surplus of tourists	26	40 - 70


PROPOSED
BEAVER VALLEY
CONSERVATION AREA
—LEGEND—
CLIFF
BUILDINGS
WOODLAND
1320 660 0 1320 2640 3960
SCALE
FEET
D.P.&D.
CONSERVATION BRANCH
1959
B.A.E.
EUGENIA LAKE
FLUMES
COUNTY ROAD
COUNTY ROAD
LOT 3
LOT 2
LOT 1
LOT 26
LOT 25
LOT 24
LOT 23
LOT 22
LOT 21
PROPERTY BOUNDARY
PROPERTY BOUNDARY
BEAVER RIVER
PROPOSED SWIMMING AREA
EUPHRASIA TWP.
ARTEMESIA TWP.
BOWLES GULLY
SKI RUN
PROPOSED DRIVE
PROPOSED DRIVE
DAM
CON V
CON VI
CON XIV
CON XIII
CON XII
CON. XI

(b) Physical Features

The proposed park combines in the smallest possible area almost all the major features of the North Grey Region; the escarpment, the glacial valley plain, the river and the inland lakes.

The most prominent of all the physical features in the Region (and indeed even in the province) is the Niagara escarpment, whose slopes are of scenic value in almost all places where the escarpment is pronounced or recognizable, such as near Hamilton, Milton, the Credit Forks and the Blue Mountain. However, in all these places the grandeur of the escarpment is depicted on a single face - a single slope. Only in the Beaver Valley where the escarpment contains a deep and narrow structural notch, does one see the juxtaposition of two slopes facing each other. In addition, both the head and the limbs of the notch are incised by different streams before they join at the floor of the valley.

In some places the escarpment slopes are moderate and manageable; in others, they stand out as sheer precipices of exposed limestone. The most pronounced of these is the "horseshoe" exposure known as Bowles Gully (or Gulch) on the western limb of the escarpment. Assailing this rocky exposure is an adventure in itself, one that can be easily presented to the teenager as a small-scale mountaineering experience. The adventure is exciting, but also hazardous at present. With the provision of safer trails and paths, and conducted under supervision, the hazard would be eliminated. The top of the Gulch would provide a breath-taking view of the entire valley. Similar exposures also occur on the opposite valley wall south-east of Kimberley. They are quite as massive and vertical as the Bowles Gulch but less interesting because they lie in a plain, straight line. On the other hand, they attract more attention because there is no curve in the face to hide the view of the precipice from the valley. The cliffs do not contain any caves, but vertical cleavages across horizontal strata impart to them a

assive architectural pattern formed by huge rectangular blocks f limestone.

Between the two walls flows the Beaver, a river f great beauty. The river descends from the Eugenia reservoir hrough a small but picturesque waterfall (Eugenia Falls), which s already a regular haunt of the amateur painter and photographer. n reaching the floor of the valley it makes a right-angle turn to he north to flow at the base of the ready-made pre-glacial valley. t this bend, the Beaver also receives the Boyne, a small but outhful stream which has cut its way straight across the head f the structural notch north of Flesherton. The bend in the iver as well as its junction with the Boyne lie within, and close o, the northern edge of the proposed park. Downstream from the end the Beaver twists and turns its way through a deeply wooded rea. Its waters are cool, clear and shallow, the current is wift and the river abounds in fish. A number of fishing clubs ave acquired the river and river land and enjoy a flourishing ncome. One of these clubs lies within the proposed park.

In the park area the Beaver also receives a umber of tributaries from both sides of the valley. The longest nd prettiest of these tributaries comes from the western side - a small creek which skirts the hollow of the Bowles Gulch before descending the slope to join the Beaver. Even more dramatic are the disappearing streams at the back of the escarpment on both sides of the valley. One such stream lies two miles north of Bowles Gulch and one can actually see its waters eddy down and disappear into a hole in the ground. There are two similar streams on the eastern brow of the valley two miles east of Kimberley and the same distance south of Duncan Lake. Such sites can be easily developed into points of special tourist interest and should have considerable attraction and educative value, particularly for the younger folk.

The proposed Conservation Area would also lie close to Eugenia Lake. This is already a popular tourist resort and

ts southern edge is ringed with private and commercial summer cottages.

Fishing is quite common in most sections of these waters, but swimming is at present possible only in Eugenia and Duncan Lakes, and even here it is not very popular because the lakes have muddy bottoms and hardly any beaches. Once the proposed project is taken in hand it should not be too difficult to convert a section of the Beaver Valley into a reasonably large swimming pool. One section which is particularly suitable for such development lies just north of the Artemesia Township boundary. Here the river has a choice of two channels. By damming the river at the point where the channels rejoin, the area behind the dam could be flooded to serve as a pond. A screen at the head of the pond would ensure a supply of fresh water to the pond yet stop the fish from entering it - the fish consequently following the isolated channel in the east. Flow of water from the pond could also be regulated through sluices in the holding dam, thus ensuring a desired depth of water in the pond.

(c) Forest Cover

Approximately 1,070 acres, or 36 per cent, of the proposed Area is in forest. The forest cover is well distributed between the steep slopes and the valley bottom. The median zone (intervening between the valley floor and the steep sides of the escarpment) has been mostly cleared of trees and lies in natural or cultivated pasture. There is a close correlation between the degree of steepness and the density of the tree cover; the milder the slopes, the greater the clearing of land for pasture. The tree cover is not entirely continuous but is divided into blocks of varying size by intervening swaths of cleared land. This alternation of dense wooded blocks and bare strips enhances the pictorial value of the entire area. Deep greens alternating with lighter shades of the same colour and contrasted by the yellow patches of pasture, and the golden hues of the turning leaves of other trees, produce a highly varied colour pattern making the valley in spring and fall a painter's paradise.

Hardwoods, (mainly maple, beech and poplar) occupy nearly three-quarters of the woodland. They are concentrated on the upper slopes, while ash and elm occupy the valley floor. There are a number of small blocks consisting of young evergreens which are quite prominent by their darker hue in the spring, and by the contrast their dark green introduces in the varying shades of yellow and gold of the hardwoods during the fall season. By and large these consist of cedar in the valley floor and pine in the newly forested areas on the slopes. The largest block of evergreens (mostly young cedar) is 148 acres in area and lies just below the confluence of the Boyne and Beaver Rivers. Three other small clumps dot the various valley sections farther downstream and a few occur even on the escarpment slopes.

The valley floor is rather ill drained, although swamps skirted by reeds and willows are not as extensive now as they must have been in the past. Some of these have been drained by the farmers who acquired the adjacent lands; others have acquired thicker tree growth, consisting mainly of ash, elm and willow. At present, the only large area of swamp within the proposed park is the 17-acre depression lying downstream from the point where the creek from Bowles Gulch joins the Beaver River. Much of it is already dry. It is this depression which has been recommended for conversion into a swimming pool.

(d) Wildlife

Since this area contains many different land and vegetation types, including rocky slopes, cliffs, pastures, both dry and wet woodlands, hedges, cultivated land and gardens, it naturally contains also a wide variety of fauna. No specific study of the fauna of the area was made during the 1957 survey, but it is a safe assumption that about 30 species of mammals are present, and that about 150 species of birds either migrate through or are resident in this tract of land.

Deer tracks were seen in the area during the survey. The Ruffed Grouse or partridge is present in small numbers. The area does not now contain a suitable habitat for waterfowl.

The Beaver and Boyne Rivers are both regularly stocked with brook trout and brown trout. Most of the stocking has been made with brook trout. The Beaver River above its junction with the Boyne has very little flow in summer, since the river is diverted down the flumes from Eugenia Lake. In its course through the proposed park the Beaver River is mostly shallow and lacking in cover. This stream could be easily improved for fishing by small check dams, and by deflectors which would force the stream to dig deep holes. These would in one or two years much improve the habitat for fish.

(e) <u>Existing Land Use and Property Acquisition</u>

The major uses within the park area are listed below:

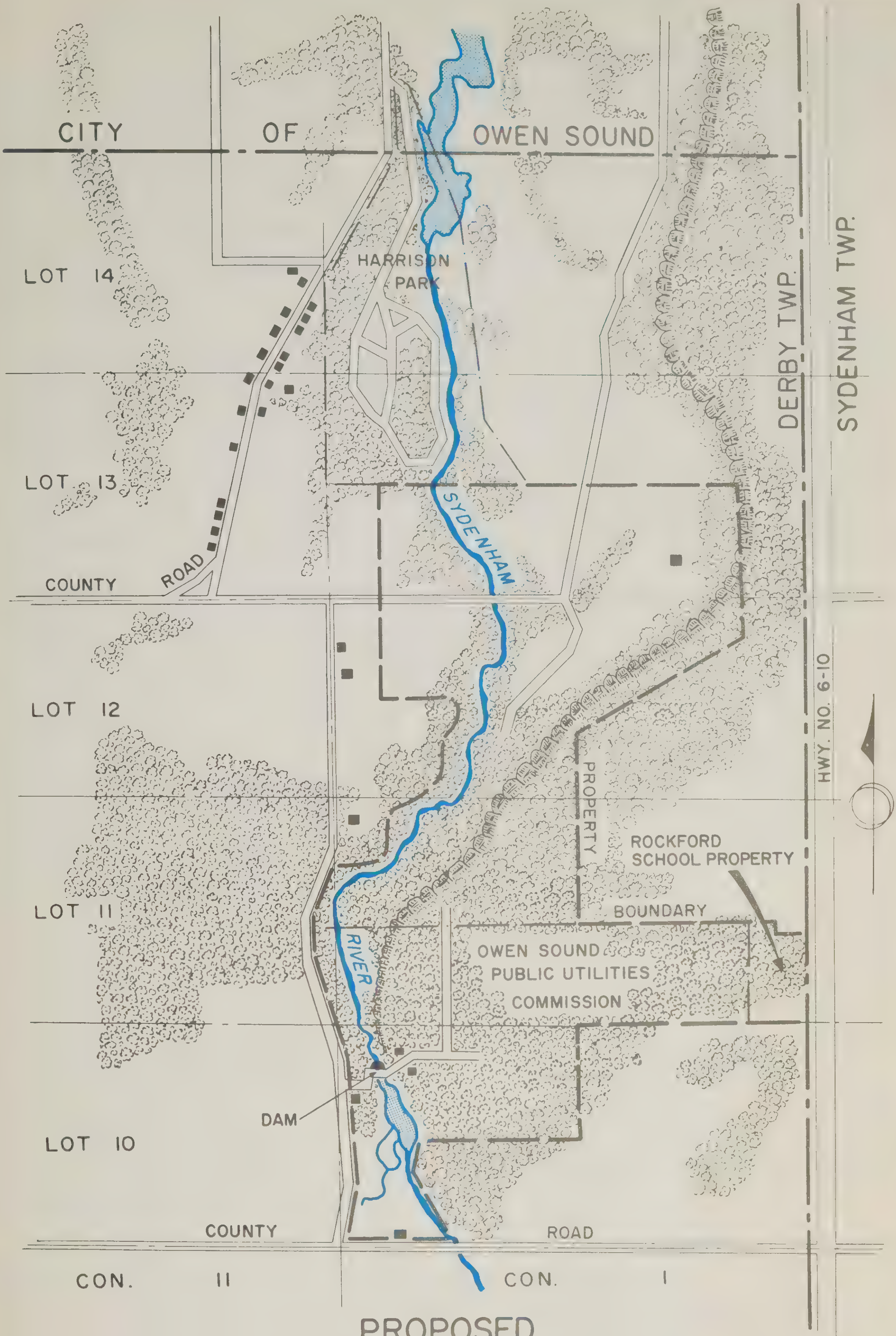
(1) <u>Grazing</u>

Approximately 1,500 acres or 50 per cent of the area consists of either natural meadow or cultivated pasture. The land which has been cleared for pasture mainly occupies mild slopes, and the value or price of land depends clearly on the degree of slope.

(2) <u>Skiing</u>

The length and the variety of escarpment slopes lend themselves to the large-scale development of skiing facilities in the Beaver Valley. At present the popular ski areas lie farther north near Collingwood but the ski clubs there are already becoming crowded. With the rapid increase in the popularity of skiing, expansion of skiing facilities is imminent and both the slopes of the Beaver Valley offer skiing sites comparable to and even better than those in the Blue Mountains. A unique feature of the Beaver Valley slopes is that skiers can get to the run by car both at the top and the bottom end.

At present there is only a small ski run owned and operated by a local resident. This run lies half a mile north of Bowles Gulch. The ski run is served by a single tow and is used by an average of 300 skiers on a bright winter day, (mostly Saturdays and Sundays).



PROPOSED INGLIS FALLS CONSERVATION AREA

—LEGEND—

CLIFF

BUILDINGS

WOODLAND

SCALE 1320 660 0 1320 2640 3960 FEET

D.P.&D. CONSERVATION BRANCH B.A.E.

1959

(f) Driveways

Access to the park can be had by a number of country roads all of which are virtually scenic drives. The road best maintained is the county road running due north from Eugenia to Kimberley and on to Thornbury. This road crosses the valley obliquely and has an easy grade. It crosses the valley at Kimberley which is connected by almost direct routes to Meaford and Thornbury on No. 26 highway and to Flesherton on No. 10 highway. The proposed Conservation Area lies only 2 miles south of Kimberley. For these reasons it is this road which will probably bring the bulk of the traffic to the Area. On the other hand the road being easy and straight makes for rather unexciting driving and does not unfold the valley before the driver's view with the same impact as can be experienced on those roads which cross at right angles to the slopes. One of these - from Vandeleur to Eugenia - will go through the Conservation Area and the other - from Wodehouse to Duncan Lake - crosses the valley just north of Kimberley. These roads will probably have to be improved for the benefit of the increased future traffic although it may be mentioned that much of the driving thrill they afford at the present is largely due to the fact that they are narrow and difficult to negotiate.

Another scenic route is provided by the road which runs along the valley floor almost from Flesherton to Kimberley. This road descends the narrow cleft in the escarpment and runs between steep walls and dense woods with the river perpetually at its side. This road offers the shortest route from No. 10 highway into the Conservation Area and traverses the most picturesque part of the Beaver and Boyne valleys.

As the Area develops it will be desirable to provide a motorable road close to the brow of the escarpment so as to enable the tourist to get the visual impact of the valley in full.

|. Inglis Falls Conservation Area

(a) Regional Location

This recommended Conservation Area when developed will not only absorb the local pressure but will also cater to the growing recreation demand in Southern Ontario. It lies near

the junction of three main Ontario highways which make it accessible to both Toronto and Hamilton which lie within 120 miles of this Area. The Toronto-Hamilton region, inclusive of the cities and towns between and around these two major cities, comprises more than 50 per cent of the urban population of Ontario. During the summer, holidayers from this area crowd into the Lake Simcoe-Wasaga Beach region, which is approaching saturation point in regard to its recreation facilities. Moreover, as recreation in this area becomes more and more commercialized and expensive, the less fortunate, as well as the more discerning tourist is attracted to quiet, more picturesque areas to spend his holidays. The area between Inglis Falls and Harrison Park offers these advantages.

(b) The Physical Features of the Area

After the Beaver, the Sydenham is the most picturesque river in the Region. It exhibits many interesting features. Here the Sydenham plunges 150 feet down the sheer face of the escarpment producing a small "Niagara Falls" of its own. The erosional action of the river, occasional rock banding, with frequent fossilization, and deep structural crevices on the surface of the escarpment on either side of the river should be of special interest to those interested in local and general geology. Similarly the dense forest cover on either side of the river exhibits a great variety of trees and wild plants which should be of particular interest to the botanist. All these features combine to give the Inglis Falls both recreational and educative value.

From the foot of the falls, the river tumbles down a shallow but rocky staircase for nearly half a mile before settling to a more even flow in the valley it has carved for itself. Here it is skirted by the sheer walls of the escarpment which recede from the river as one moves northward. For the better part, the escarpment walls are covered with woodland, but there are quite a few bare patches which gleam brilliantly at dawn and dusk, their golden and silver reflections producing fascinating

ontrasts to the green hues that surround them.

After flowing gently for a mile in this section of he valley, the Sydenham displays new vigour in the southern ection of Harrison Park, where it cuts through a narrow band of ock and moraine. Beyond this point the river quite suddenly hanges its aspect and becomes slow and lazy in the northern part f the Harrison Park. Thus, in a short stretch of three miles he river exhibits a number of stages and behaviour patterns hich should have considerable educative value for students and ourists alike.

(c) <u>Forest Cover</u>

The ravine carved by the river, and the escarpment lope on the eastern side, form two separate bands of dense forest over. In the region of the Inglis Falls and for a mile down-tream from the falls, the two bands are joined, but then they iverge; the ravine continues due north and the escarpment veers o the north-east. Between these bands lies the glacial basin hich is now bare of trees and contains natural and cultivated asture land.

Eighty per cent of the proposed Area is covered ith trees, of which 74 per cent are hardwoods. The escarpment lopes and the Sydenham Valley up to half a mile below the scarpment contain mainly poplar, beech and maple trees. The ow-lying ravine areas contain elm, ash, willow and tamarack, most f which are rather scrubby. Cedar is common and other species re present in sufficient numbers to give variety to the vegetation. pproximately 60 per cent of the trees are young and thin, 5 to 10 nches in diameter, 25 per cent are of 10 to 15 inches diameter, per cent of more than 15 inches diameter and the remaining 10 per ent are very small trees, less than 5 inches thick. The large r broad trees are found mainly in Harrison Park, and to a very mall extent in the Inglis Falls Area. With the acquisition f the area for recreation purposes, and with the clearing of the ndergrowth in many places, the appearance would be greatly mproved.

Stately trees certainly enhance the beauty of a ecreation area but their absence in any given area does not ecessarily reduce the recreational appeal of the area. In the roposed park the lack of size is more than compensated by the ariety of trees, which produces another kind of beauty. A major onsideration with most holidayers is the amount of available hade. Of this there will be certainly no dearth in the proposed onservation Area.

(d) Water Resources

Another resource important for its recreational alue is the availability of water, not only in the degree to hich it enhances the beauty of the resort area, but also the egree to which it can be used for swimming, boating and fishing.

(1) Swimming

At the present time the Sydenham River offers no wimming facilities except in a small section upstream from the am in the city. The waters in this section of the river are ot particularly clean, and most of the swimming available to the ity children is to be had only in the two small artificial pools n Harrison Park. The development of a swimming area in the ydenham River is possible and will satisfy a most urgent demand. eference has already been made to the possibility of developing ne such area within Harrison Park. Another area which will be a ittle more expensive to develop lies a mile and a half farther pstream. This is the section where the escarpment moves away rom the valley.

In this section the river has a rocky base. It is ossible to isolate part of the rocky bed by diverting the main low of the river into, and through, an artificial channel, with nly part of the flow being allowed to enter the old or isolated ed. By erecting retaining walls at the side, and a barrier wall t the lower end, a basin would be created. This basin could then e used as a swimming pool. During the winter water supply to his basin could be sealed off at the source, thus permitting quick reezing of the contained water; the frozen surface could then erve as an open-air skating rink.

(2) Fishing

In its upper reaches, the Sydenham River is annually ocked and quite well-known for fishing. Considering that most the fishermen frequent the area in May and June, but few in ly and August, it may be construed that the supply of larger sh is exhausted in the first two summer months. Some brown and inbow trout are also caught below the escarpment. Some of these e quite large - 1 to 4 pounds - but on the whole fishing in the wer Sydenham is quite poor.

(3) Boating

Some row-boating is available in the lower Sydenham Harrison Park. Up from the park, the river channel is neither eep nor broad enough to permit any boating.

(e) Picnic Facilities

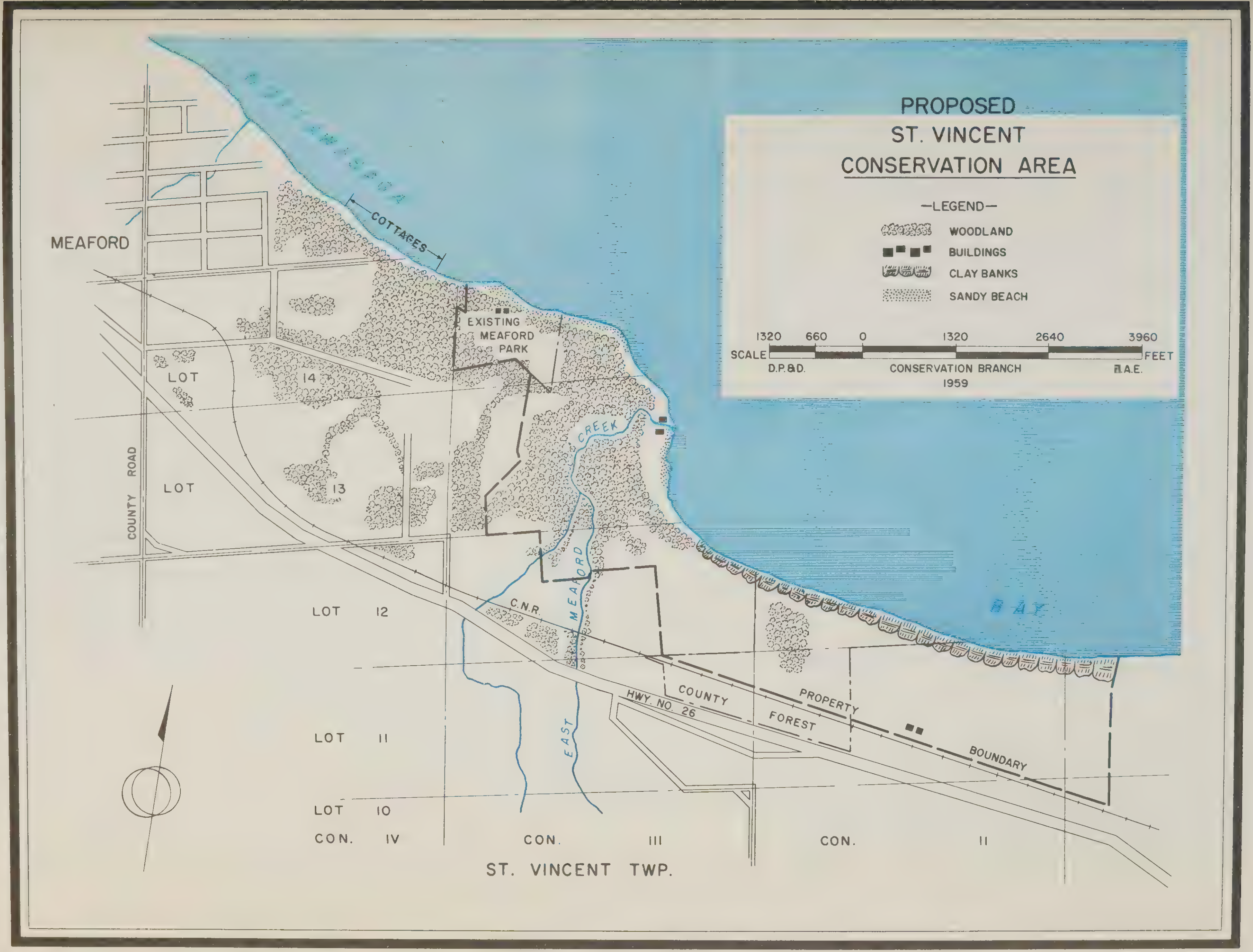
The shady ravine and the clear waters of the river ake the entire ravine one extensive picnic area. With the equisition of the area for park purposes, family picnicking would ecome greatly popular here if the open flat spaces on the east ank of the river could be converted into playing fields. Hiking hrough the bush to the foot of the falls, or through the bush top the escarpment could become quite popular with the young folk f a few trails were blazed and paths cleaned up.

(f) Skiing

On the whole, the escarpment slopes are too steep r narrow to produce a long, open ski-run. Nevertheless, some kiing is possible and one small run is already in use. Limited xpansion and improvement of this run is possible, and certainly esirable in view of the increasing enthusiasm for skiing in the rea.

(g) Present Use

At present the land is not used for recreation urposes except, of course, in the Harrison Park section. ccasionally some tourists may visit the Inglis Falls, the environs f which have a deserted appearance. Until a few years ago there


PROPOSED
ST. VINCENT
CONSERVATION AREA
—LEGEND—
WOODLAND
BUILDINGS
CLAY BANKS
SANDY BEACH
SCALE
1320 660 0 1320 2640 3960
FEET
D.P.&D.
CONSERVATION BRANCH
1959
R.A.E.
MEAFORD
COTTAGES
EXISTING MEAFORD PARK
COUNTY ROAD
LOT
LOT
LOT 14
LOT 13
LOT 12
LOT 11
LOT 10
CREEK
MEAFORD
EAST
C.N.R.
HWY. NO. 26
COUNTY FOREST
PROPERTY BOUNDARY
BAY
CON. IV
CON. III
CON. II
ST. VINCENT TWP.

as a grist and flour mill on the eastern bank but it has ceased o function.

The most important existing development in the roposed Area is the management of the Sydenham River which upplies drinking water to the City of Owen Sound. The Public tilities Commission has bought a 200-acre tract upstream from nglis Falls. Just above the falls a dam across the river nables the water to be contained in a pond from which it is piped o the city. The artificial pond is surrounded by trees and has couple of small islands. It adds to the scenic environment of nglis Falls and in this respect will conform to the proposed use f the Area as a whole.

(h) <u>Property Acquisition</u>

Of the proposed Conservation Area 294 acres are lready in public ownership. This leaves 105 acres of privately-wned property to be acquired.

. <u>St. Vincent Conservation Area</u>

At the present time the Meaford Park possesses the nly good piece of sandy beach available to the general public in he entire shoreline of Georgian Bay from Wasaga Beach to Owen ound; all the other sandy stretches of reasonable size have been ppropriated by cottage owners. As swimming remains the major ecreational activity during the summer it is important that wimming facilities for the general public should be improved and xtended. There are only two stretches of shoreline in the Region here this can be achieved; one of these is in the vicinity of eaford Park, another is near Coffin Cove.

The entire land lying below the Algonquin Beach represented here by almost a 100-foot drop south of the park) and etween the mouth of the East Meaford Creek and the existing park, s a former off-shore beach consisting of coarse sandy soil which s at present covered with woods. A strip of sandy beach can asily be developed after removing the trees from the shore, thus xtending the beach eastwards from the park. East of the creek

the old shore of the pre-glacial Algonquin Lake becomes a shore cliff which is spectacularly represented by steep clay banks. The top of the clay banks is bare of trees except for a small patch of woodland on the county forest. It is suggested that all the land including the clay banks, the county forest and the area below the old Algonquin beach, should be acquired by the Authority and converted into a public recreation area.

This must be done soon. Otherwise all the low-lying shore area even in this section will be acquired by cottage owners in the same way as it has been acquired at the western end of the park. At present only Craigleith Park and Meaford Park have public beaches but these are already quite crowded. Tourist pressure continues to increase and it is safe to assume that the beaches will soon reach saturation point. Possibilities of expansion of the Craigleith Park are very limited. In order to plan for the needs of future public recreation, this Conservation Area is urgently needed.

By virtue of its size, the expanded park would provide a variety of recreational activity. Nature study and hiking through the bush land could be very rewarding.

As the East Meaford Creek lies in private property, the extent or quality of fishing in the creek could not be ascertained. Local reports indicate that until a few years ago many brown trout were stocked and some were later caught. These fish can easily be stocked in the creek.

It is suggested that the acquired area should be bounded by Meaford Community Park in the west, by the C.N.R. tracks in the south and by the line between Concessions I and II (St. Vincent Township) in the east. This would leave out the tourist cottages between the clay banks and Boucher Point, and would provide a 400-acre Conservation Area. Of the recommended area, an 87-acre tract belongs to the county; the remaining 343 acres are privately owned.


CON.
IIIW
CON.
IIW
LOT B
LOT C
LOT D
LOT E
LOT F
LOT G
LOT H
SULLIVAN
TWP.
SYDENHAM RIVER
PROPERTY
BOUNDARY
SULLIVAN
MILLS
DAM
PROPOSED
SULLIVAN MILLS
CONSERVATION AREA
—LEGEND—
WOODLAND
BUILDINGS
660 330 0 660 1320 1980
SCALE
FEET
D.P.&D.
CONSERVATION BR.
1959
B.A.E.

Present Uses

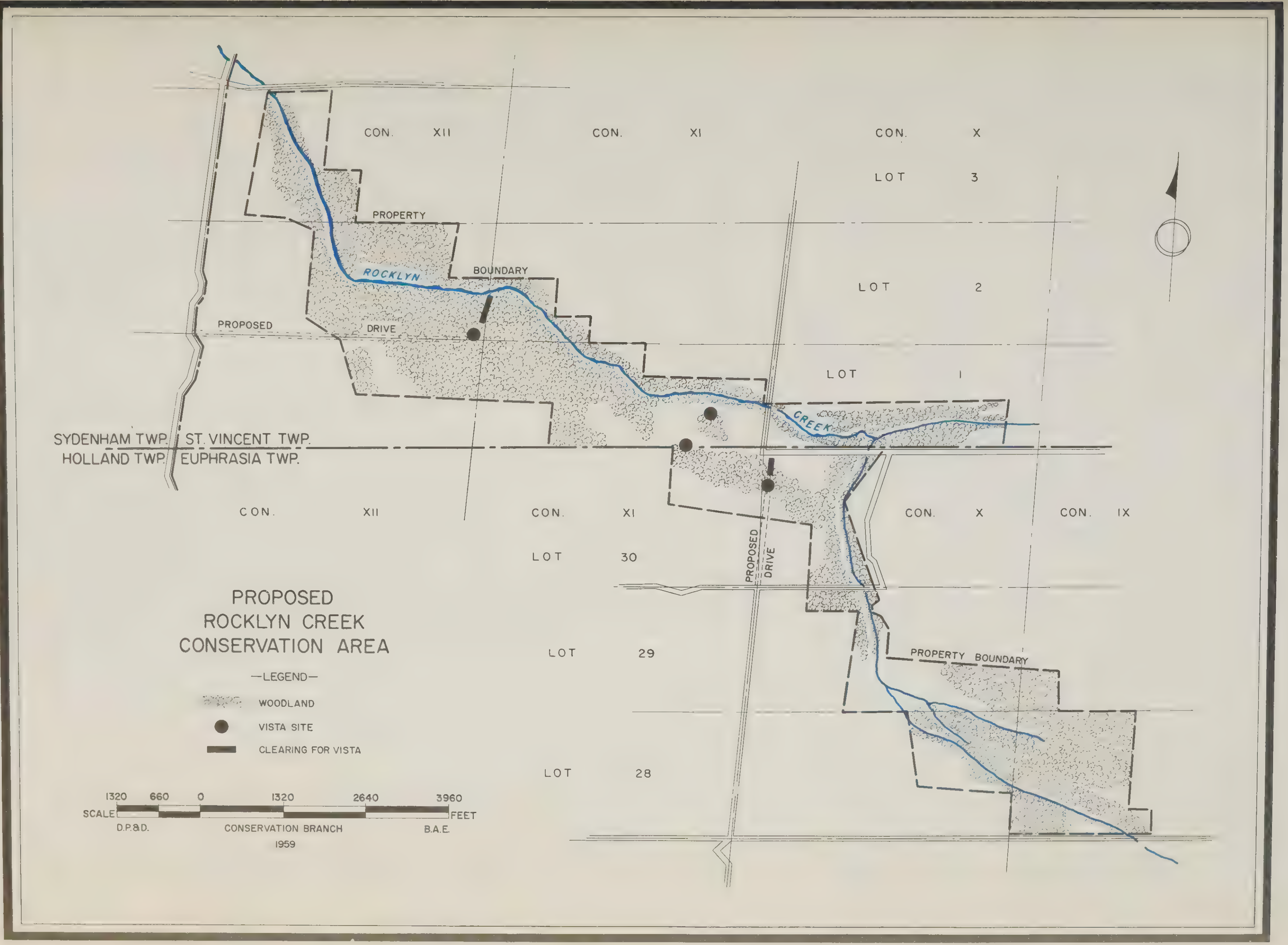
The property in Concession III is mostly wooded and contains three summer cottages near the mouth of the East Meaford Creek. The property in Concession II contains a 25-acre woodlot, the farmer's home and an old barn. The bulk of this property is in pasture, only a small portion of which is ploughed from year to year. Displacement of present use in the entire recommended St. Vincent Conservation Area involves only three summer cottages, two farmer's buildings and 190 acres of pasture land.

4. Sullivan Mills Conservation Area

This Area occupies 170 acres of land on either side of the Sydenham River in Lots B to H, Concession IIW, in Sullivan Township. Here the river is met by a small creek from the east, and makes an "S" bend before adopting the more definite northerly course. It cuts through a hard ledge of land and has been dammed at the constriction point to produce a mill pond, the ponded waters being used to run a small flour and grist mill. Both upstream and downstream from this pond the river has been well-known for trout-fishing, and sizeable catches are made for the better part of the season. This is partly owing to the annual stocking done by the provincial fish hatchery three miles farther upstream and partly because the property is privately owned and the number of fishermen is thus restricted. In view of the rapidity with which all the good fishing areas are being acquired by private fishing clubs, it is suggested that this part of the Sydenham River might be acquired for public use.

5. Rocklyn Creek Conservation Area

The section of Rocklyn Creek in Concessions IX, X, XI and XII of St. Vincent and Euphrasia Townships provides excellent fishing - the best in the entire length of the stream, and one of the best in the entire North Grey Region. Here the creek waters are two to five feet deep - they flow over a gravel and sand bed in a valley deeply incised between moraines and drumlins. The southern rim of the valley lies at an altitude of over 1,200 feet,


CON. XII
CON. XI
CON. X
LOT 3
LOT 2
LOT 1
PROPERTY BOUNDARY
ROCKLYN CREEK
PROPOSED DRIVE
SYDENHAM TWP. | ST. VINCENT TWP.
HOLLAND TWP. | EUPHRASIA TWP.
CON. XII
CON. XI
CON. X
CON. IX
LOT 30
LOT 29
LOT 28
PROPOSED DRIVE
PROPERTY BOUNDARY
PROPOSED
ROCKLYN CREEK
CONSERVATION AREA
—LEGEND—
WOODLAND
VISTA SITE
CLEARING FOR VISTA
SCALE 1320 660 0 1320 2640 3960 FEET
D.P.&D. CONSERVATION BRANCH B.A.E.
1959

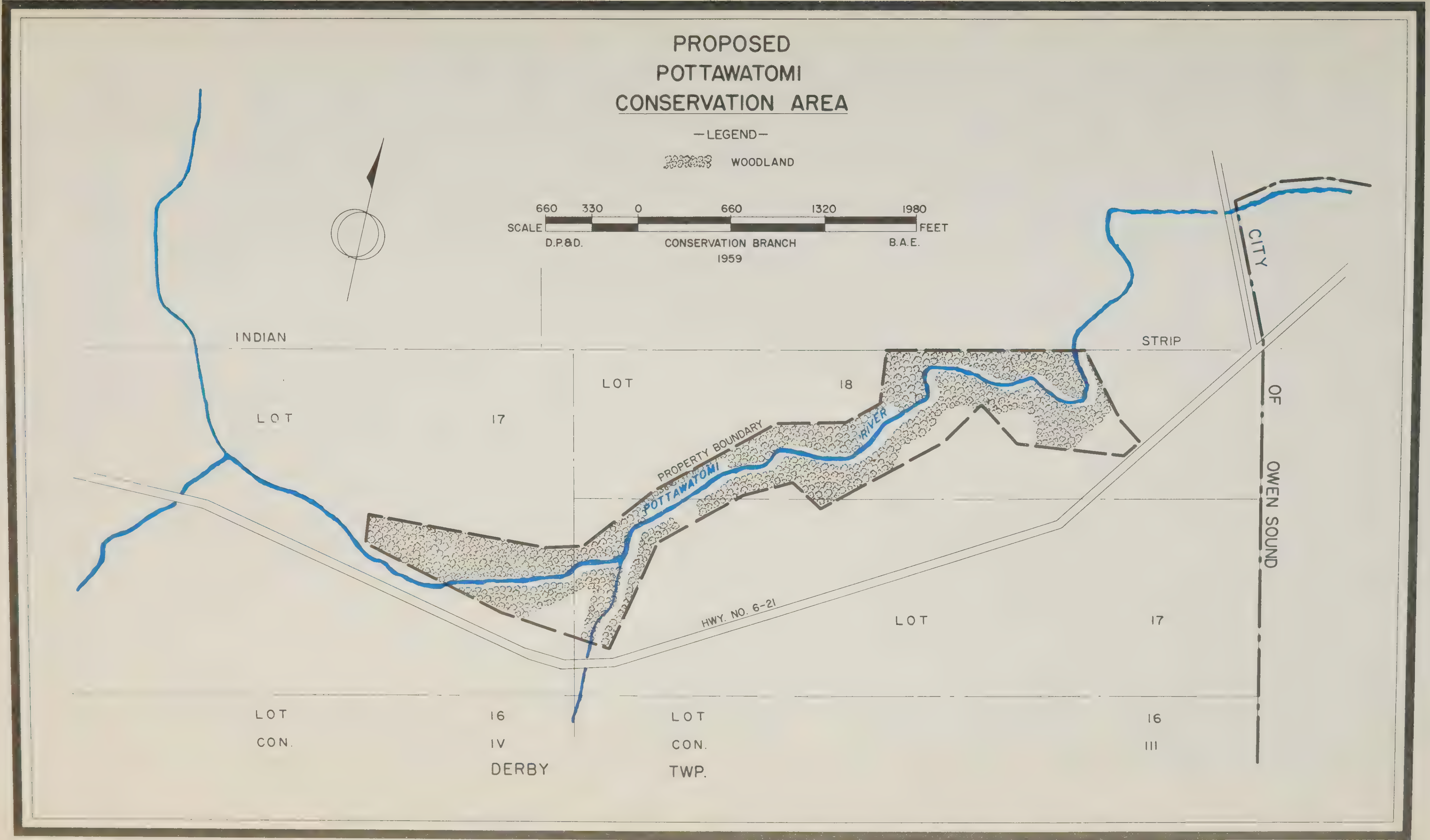
and provides a beautiful view of the drumlin country to the north. Hummocky hills stretch seemingly endlessly before the eye of the observer. Like so many eggs in a flat basket, they grade out to the north, their cleared sides interspersed with strips and blocks of woodlots, their rounded slopes superimposed with the rectangular pattern of field layouts, producing an unusual and impressive scenery.

The proposed Conservation Area constitutes a ribbon containing excellent stream fishing and the most scenic part of the Bighead basin. The park limits were determined by three main considerations - to avoid inclusion of agricultural land, to incorporate those sections of the high bank which would provide a view of the surrounding land, and to include such woodlots as contain trees which are either of no great economic value or which need protection and improvement.

Of the 730 acres of the proposed Area, 410 acres contain broad-leaved trees, 120 acres contain evergreens and 200 acres consist of bare land most of which is in pasture or swamp. The incorporation of these woodlots in the proposed park will enable the much-needed conservation and improvement of natural vegetation in the area.

Although the area includes 200 acres of bare land, it is mostly disjointed pieces which are not suitable for cropping. The bulk of open land consists of river flats, and the cleared land even atop the banks has very poor soils. The proposed Area would involve acquisition of parts of three different properties.

This proposed Conservation Area does not have easy access, and is about 10 miles from each of the three provincial highways (Nos. 6, 10 and 26). It should be popular only with those who are interested either in driving through the country or in fishing. Picnicking facilities can be provided for the families on the high southern bank which commands a beautiful prospect. Short stretches of roadway to these sites would have to be built for the convenience of driving to and parking close to the sites.



PROPOSED
POTTAWATOMI
CONSERVATION AREA
—LEGEND—
WOODLAND
660 330 0 660 1320 1980
SCALE
FEET
D.P.&D.
CONSERVATION BRANCH
1959
B.A.E.
INDIAN
STRIP
CITY
OF
OWEN SOUND
LOT
17
LOT
18
PROPERTY BOUNDARY
POTTAWATOMI
RIVER
HWY. NO. 6-21
LOT
17
LOT
16
CON.
IV
DERBY
LOT
CON.
TWP.
16
III

Those visiting the Area could also visit the nearby Walters Falls, where Walters Creek cascades down the limestone escarpment.

6. Pottawatomi Conservation Area

This Area occupies the river and ravine land between Springmount and Owen Sound. It is a tract of land occupying 56 acres consisting of parts of Lot 17, Concession IV, and Lot 18, Concession III of Derby Township. There are only two properties involved, part of subdivision lot 35 (in Lot 17, Concession IV), and subdivision lot 24 (in Lot 18, Concession III).

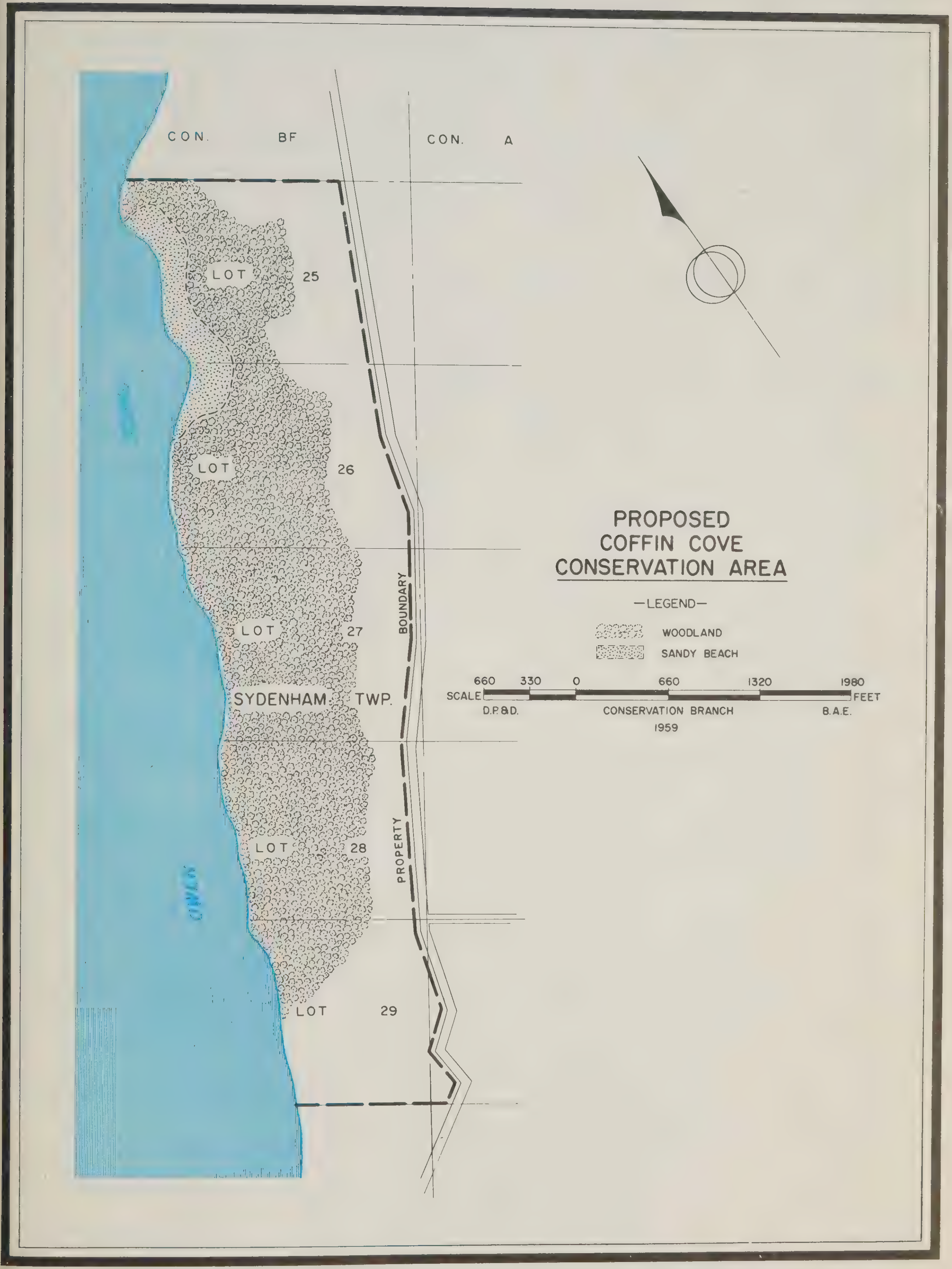
Eighty per cent of the proposed land is wooded - consisting mainly of hardwoods (maple, ash and elm). Cedar, willow, alder and ash occupy the low parts of the ravine. There is no agricultural land within the Area, the open land consisting mainly of river waters, swamp, and some natural pasture. The trees are rather scrubby - seldom exceeding 10 inches in diameter and of no economic use at present.

The river bed is rather silty, but varied with patches of bare gravel. The water is clear for the most part, varying from a depth of three feet in the western or upstream part to six feet in the eastern or downstream section. This section has always been well-known for fishing.

It is suggested that this section should again be developed and maintained as a public fishing area. If this is not done soon, this property will be appropriated for residential development, a tendency which is already apparent at the western end of Owen Sound. At present, the city of Owen Sound has a more or less continuous green strip at its western limits which extends along the escarpment from Harrison Park almost to the Owen Sound-Wiarton highway. The proposed Conservation Area will extend this green strip northwards to the river and will thus be of some benefit, not only to the township, but also to the city.

7. Coffin Cove Conservation Area

Reference has already been made to the paucity of public beaches on the shores of Nottawasaga Bay. At present there


CON. BF
CON. A
LOT 25
LOT 26
LOT 27
LOT 28
LOT 29
SYDENHAM TWP.
PROPERTY BOUNDARY
PROPOSED
COFFIN COVE
CONSERVATION AREA
—LEGEND—
WOODLAND
SANDY BEACH
SCALE 660 330 0 660 1320 1980 FEET
D.P.&D.
CONSERVATION BRANCH
1959
B.A.E.

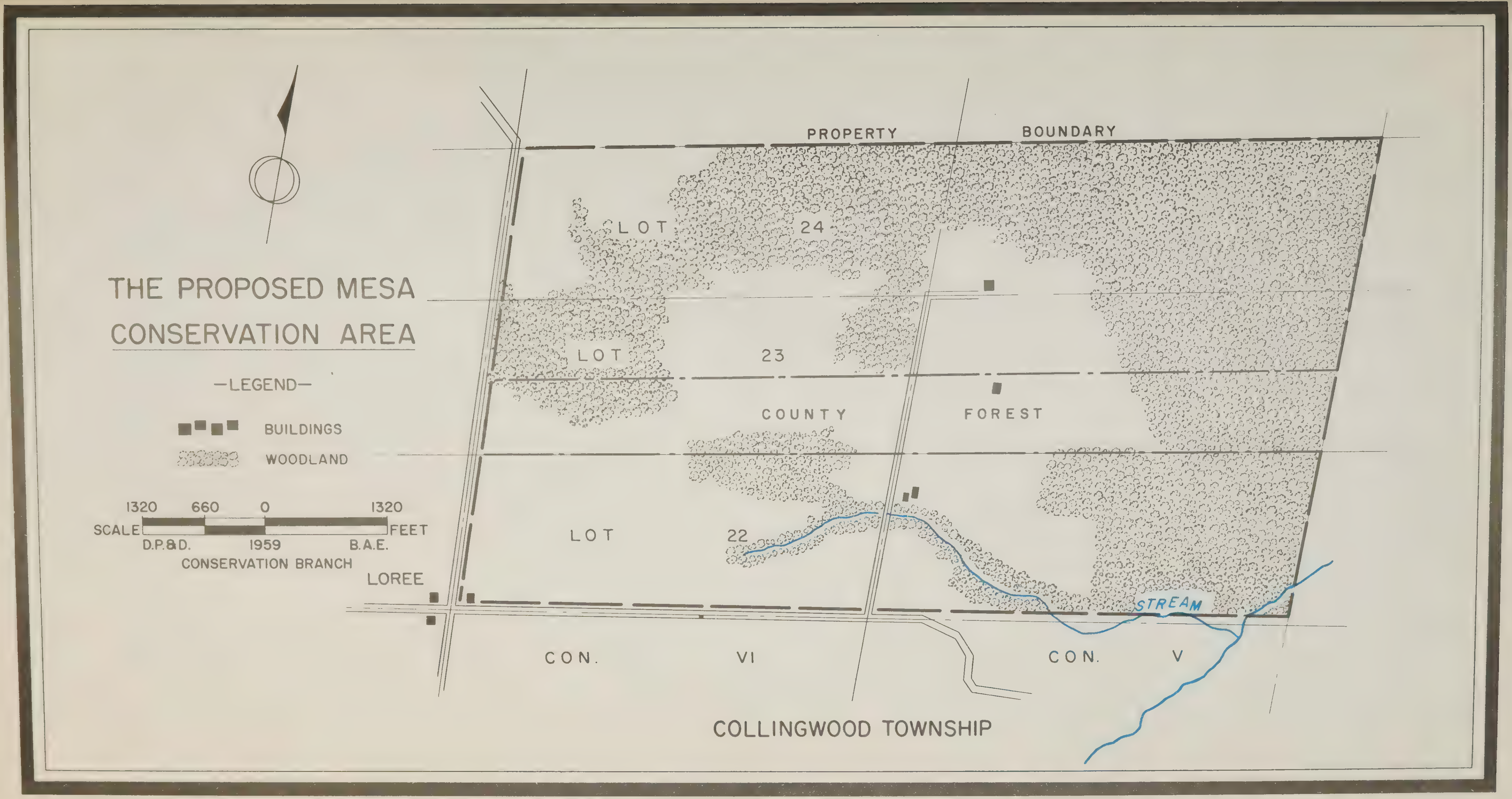
are only three areas which provide public access to the lake waters. Almost all other sandy strips along the shore have been acquired for private use by cottagers, and the few that remain will be similarly lost unless reserved soon.

One such strip lies in BF Concession, Lots 25, 26 and 27 of Sydenham Township, which has a few parts developed for private cottages. It is suggested that the strip of shore land lying below the escarpment and west of the township road which runs along the foot of the escarpment, should be acquired by the Authority for development as a public beach.

The recommended strip forms a ribbon of sandy land stretching between the northern limit of Lot 25 and the southern limit of Lot 29, west of the township road. It has an average width of 500 yards and a length of 2,200 yards, the area being approximately 230 acres. Eighty per cent of the area is woodland, consisting mainly of cedar with some deciduous trees - maple, elm and birch. Although the trees are rather small in size (8-12" in diameter) they are in one continuous block which shields the shoreline from the road. There are two stretches of sandy beach - one at either end of the proposed Area. The northern stretch is about 300 yards long and 50 yards wide and occupies the shore of Coffin Cove. The other stretch is shorter (250 yards) but broader (50 to 75 yards) and lies half a mile south from Coffin Cove, or half a mile north from the mouth of Keefer Creek.

At present the only swimming area within easy reach of the people of Owen Sound is Balmy Beach, on the western shore of Owen Sound (Bay). The proposed Area will be much larger than Balmy Beach and almost as easily accessible from Owen Sound; moreover, its waters are cleaner and its surroundings more picturesque. The woods behind the beach here should provide excellent sites for family picnics.

The proposed Area contains no buildings and no agricultural land, but only woodland consisting of trees of no great economic value. This means that its conversion into a recreation area would not only enhance its value but can be achieved without any great expense.


THE PROPOSED MESA
CONSERVATION AREA
—LEGEND—
BUILDINGS
WOODLAND
SCALE 1320 660 0 1320 FEET
D.P.&D. 1959 B.A.E.
CONSERVATION BRANCH
LOREE
PROPERTY BOUNDARY
LOT 24
LOT 23
COUNTY FOREST
LOT 22
STREAM
CON. VI
CON. V
COLLINGWOOD TOWNSHIP

8. <u>The Mesa Conservation Area</u>

Not long ago the North Grey Region was an area rich in game, but the building of highways, the expansion of population in both rural and urban settlements within the Region the increased use of the automobile and the consequent pressure of hunters from Southern Ontario, all have contributed to the rapid decline of wildlife.

The open surface of this plateau has been swept by rain and wind and much of its soil has been washed away. The central part consists of bare land, bare except for a derelict and weather-beaten orchard and extremely poor pasture. Woodland is to be found towards the edges of the plateau and increases in density on the descending slopes. Soil and forest conservation are called for and it is recommended that the Authority acquire all of the land contained in Lots 22, 23 and 24 of Concessions V and VI of Collingwood Township.

The proposed Conservation Area would contain approximately 1,100 acres out of which 600 acres are in woodland. The predominant trees are maple, beech and birch, with only occasional evergreens.

The county of Grey has already acquired 200 acres covering the entire southern half of Lot 23 in Concessions V and VI, 85 acres of which are wooded, and the balance will most likely be forested. This would leave 900 acres to be acquired by the Authority.*

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* Most of this Area has been recommended as an Authority Forest but selected areas could be reserved for recreation.

CHAPTER 7

VISTA SITES

The variety of relief and topography, the presence of the spectacular Niagara escarpment which winds across from the east to the west, the happy circumstance of the blue waters of the Georgian Bay in the north, and the abundance of hills and dales and rivers furnish the North Grey Region with numerous vantage points from which an observer can enjoy the beauty of landscape. Well distributed and fairly dense woodlands with their seasonal changes of colour add to the picturesque quality of the Region and enhance the value of the vantage points, of which there is no dearth in the Region. Only the outstanding ones are mentioned and these are indicated by numerals and the letter V on the map.

V. 1.- (Elevation - approximately 1,275 feet).

The point lies just north of Blantyre and 100 yards south of the bridge where the road to Oxmead crosses the upper reaches of Minniehill Creek. It lies at a physiographically significant location i.e., along a line which distinguishes the moraine country to the south from the drumlin country to the north. Drumlin areas, consisting mainly of small oval and oblong hills, are difficult to view because the hills being approximately of the same elevation usually obstruct the wide prospect. The point V.1. is, however, located high enough to give a panoramic view of the closely rolling landscape - "the eggs-in-basket" type of topography which lies to the north. Clearing of a space up on the brow of the slope and west of the road would provide an excellent and natural viewing platform.

V. 2.- (Elevation approximately 1,350 feet).

This point lies exactly one concession east of V. 1, just under three miles north of Rocklyn (on the Rocklyn-Minniehill road). The point is 75 feet higher than

V. 1, and gives a view similar to the one from V. 1.

V. 3.-

This point lies on the Epping-to-Meaford road where the road crosses the Griersville Rock. The Rock is in fact the exposed edge of the Niagara escarpment. It has an elevation of approximately 1,300 feet and gives an excellent view of the drumlin country in the north-west and the moraine plateau type of landscape in the north-east. The point lies halfway between Griersville (in the north) and the township line (in the south).

V. 4 and V. 5.

Both these points lie at the brow of an old terrace overlooking the narrow coastal plain between Meaford and Boucher Point and give a most striking view of the blue waters of Nottawasaga Bay. V. 4 lies just a mile south of Meaford on the county road to Eugenia and a part of the school grounds should here serve as a satisfactory observation area. V. 5 lies one road eastward.

V. 6, V. 7.

These two lie on the Meaford to Eugenia road at points where the road (which otherwise crosses the Beaver Valley rather obliquely) descends the main slope of the high banks. Both points give a breath-taking view of the picturesque valley. Clearing of trees off the convex edge of the road bends will be required for the convenience of the tourists. V. 6 lies in the north, i.e. at the western bank, V. 7 in the south, i.e. at the eastern bank of the valley.

V. 8, V. 9.

These two points close to Vandeleur provide an even more spectacular view particularly as they are located along roads which descend the high western bank of the Beaver Valley more abruptly - almost at right angles. Apart from the

view, driving down these roads (which are by no means improved roads) is itself a thrilling experience not easily forgotten. Even if the roads are improved it is proposed that they should not be paved or widened greatly, because that would detract from the thrill of the drive. (It may be pointed out that even though narrow the roads are not hazardous).

V. 10, V. 11.

The first point lies atop the Blue Mountain at a point where the road from Collingwood reaches the brow of the slope and makes a westward bend. There are a number of points on this slope where roadside vista sites can be developed but the most spectacular point lies at the very top of the mountain. From this high point (elevation 1,500 feet) one stands at the head of a creek which incises a straight path down the slope to the east. In the far distance one sees not only the city of Collingwood, but an entire expanse of shoreland and Georgian Bay all the way to Wasaga Beach. Close by (although just outside the Region) lie the well-known caves - structural and solution hollows in the vertical limestone strata of the Blue Mountains. The condition of the road down the slope actually outside the boundary of the North Grey Region, is rather poor but westwards across the plateau the road is quite satisfactory.

The other point V. 11 lies on the same road about one mile east of Ravenna. It gives one of the finest views obtainable northward over the rich orchard land of the lower Beaver Valley, the town of Thornbury, past Meaford and the blue waters of the bay to the striking headland of Cape Rich.